

Data Evaluation Record on the Toxicity of Dicamba DGA salt and Glyphosate potassium salt to Terrestrial Vascular Plants: Soybean Yield

PMRA Submission Number {.....}

EPA MRID Number 51017505

Data Requirement: PMRA Data Code: 9.8.4 (TGAI) or 9.8.6 (EP)
EPA DP Barcode: N/A
OECD Data Point: IIA 8.12 (TGAI) and IIIA 10.8.1.1 (EP)
MRID: 51017505
EPA Guideline: 850.4150

Test material: Clarity® formulation (a.i. Dicamba DGA salt) Purity: 39.6% a.e. (w/w); 480 g/L
Roundup PowerMax® formulation (a.i. Glyphosate potassium salt) Purity: 39.74% a.e. (w/w); 540 g/L

Common name: Dicamba DGA and Glyphosate

Chemical name: IUPAC: 3,6-Dichloro-o-anisic acid-2-(2-aminoethoxy)ethanol (Dicamba DGA)
N-(phosphonomethyl)glycine (Glyphosate)
CAS name: 2-(2-Aminoethoxy)ethanol;3,6-dichloro-2-methoxy-benzoic acid (Dicamba DGA)
N-(phosphonomethyl)glycine (Glyphosate)
CAS No.: 104040-79-1 (Dicamba DGA salt)
70901-12-1 (Glyphosate potassium salt)
Synonyms: Diglycolamine salt of 3,6-dichloro-o-anisic acid

Primary Reviewer: Kindra Bozicevich
Senior Scientist, CDM/CSS-Dynamac JV

Kinsha Bozicevich
Signature: *Kinsha Bozicevich*
Date: 4/3/20

Secondary Reviewer: Terry Nelis
Senior Scientist, CDM/CSS-Dynamac JV

Terry Nelis
Signature: *Terry Nelis*
Date: 4/15/20

Primary Reviewer: Frank T. Farruggia, Ph.D.
{EPA/OECD/PMRA}

Date: 5/21/20  2020.10.25 13:11:47
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Secondary Reviewer(s): {.....}
{EPA/OECD/PMRA}

Date: {.....}

This Data Evaluation Record may have been altered by the Environmental Fate and Effects Division subsequent to signing by CDM/CSS-Dynamac JV personnel. The CDM/CSS-Dynamac Joint Venture role does not include establishing Agency policies.

Reference/Submission No.: {.....}

Company Code: {.....} [For PMRA]
Active Code: {.....} [For PMRA]
Use Site Category: {.....} [For PMRA]
EPA PC Code: 128931 (for Dicamba DGA salt)

Date Evaluation Completed: 21-05-2020

CITATION: Schultz, G. 2020. Potential Effects of Clarity® + Roundup PowerMax® on Soybean Plants when Applied at Low Application Rates in the Field in Illinois. Unpublished study performed by Syntech Research, Inc., Stewardson, Illinois; Eurofins EAG Agroscience, LLC, Columbia, Missouri; and Monsanto Company, Chesterfield, Missouri. Eurofins EAG Study No. 89331. Monsanto Study No.: STR-2019-0079. Report No.: MSL0030967. Study sponsored by Monsanto Company, Chesterfield, Missouri. Study initiated June 13, 2019 and completed January 13, 2020.

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EXECUTIVE SUMMARY:

The effect of Clarity® formulation (a.i. Dicamba DGA salt) + Roundup PowerMax® formulation (a.i. Glyphosate potassium salt) + Adjuvant Intact™ on the vegetative vigor of dicot (dicamba non-tolerant/glyphosate-tolerant soybean, *Glycine max*; var. 35GA32) crops was studied in a soybean yield study. Nominal concentrations ranged from 0.00030 to 0.0048 lb ae dicamba/A and 0.00068 to 0.011 lb ae glyphosate/A in the spray tank solution. The test concentrations of dicamba and glyphosate were analytically confirmed at all treatment levels, and nominal and measured application rates are provided in Table 3.

The study was conducted in a field located in Illinois (silt loam, pH 6, organic matter 2%).

Two developmental growth stage application timings were assessed, early vegetative growth stage (V3) and flowering reproductive stage (R1). The treatment field was divided into two equal fields with 24 replicate plots for each test; non-dicamba tolerant soybeans were planted on July 11, 2019. The test solutions were applied to the respective field on August 5, 2019 and August 15, 2019 for the vegetative growth test and the reproductive test, respectively. On 28 days after treatment (DAT) for both experiments, soybean plants were measured for height and assessed for visual morphology. Soybean plants were harvested for determination of yield for both studies.

When compared to the negative control, significant inhibitions in soybean plant height were found for both the vegetative growth and reproductive stages. For the vegetative growth stage, significant inhibitions in soybean height were found at 0.0003 lb ae dicamba/A and 0.000675 lb ae glyphosate/A and higher (all test concentrations). For the reproductive stage, significant inhibitions in soybean height were found at 0.0012 lb ae dicamba/A and 0.0027 lb ae glyphosate/A and higher.

When compared to the negative control, significant inhibitions in soybean yield were found for both the vegetative growth and reproductive stages. For the vegetative growth stage, significant inhibitions in soybean yield were found at 0.0003 lb ae dicamba/A and 0.000675 lb ae glyphosate/A and higher (all test concentrations). For the reproductive stage, significant inhibitions in soybean yield were found at 0.0012 lb ae dicamba/A and 0.0027 lb ae glyphosate/A and higher.

Dry weight and survival were not tested in either of the two tests.

Based on the IC_{25s}, the most sensitive endpoint was yield in the vegetative growth stage, with NOAEC and IC₂₅ values of <0.00030 and 0.00117 lb ae/A Dicamba, respectively (corresponding to a NOAEC and IC₂₅ of <0.00030 and 0.00186 lb ae/A glyphosate, respectively).

Reported visual signs of injury (VSI) included leaf cupping, epinasty of both stems and petioles, and some stunting and were readily apparent at all application rates in soybean plants in the vegetative growth study after 14 and 28 days. In the reproductive stage study, new growth leaves were cupped and some pods were curled in addition to compression of the main stem internodes. VSI was evaluated using logistic regression in Excel fit to observed VSI for each test dose. No hypothesis testing was evaluated to establish NOAEC/LOAEC endpoints. Regression equations provided in Figures 3 and 4 were used to estimate the %VSI for regression based ICx values for plant height and yield. Table 1b provides the observed (NOAECs) and estimated (ICx) average %VSI for each height and yield endpoint for 14DAT and 28DAT.

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Results Synopsis

A summary of the endpoints for height and yield are provided for dicamba (Table 1a) and glyphosate (Table 1c). Also provided in Figures 1a & 1b are the response relationships between height, VSI, yield, test concentration and evaluation time step. The average %VSI for each height and yield endpoint is provided in Table 1b. This study is scientifically sound and is classified as **supplemental**.

Table 1a. Summary of most sensitive parameters (lb ae/A Dicamba).

Species	Stage	Endpoint	NOAEC	EC ₀₅ /IC ₀₅	EC ₂₅ /IC ₂₅
Soybean	Vegetative Growth	14-DAT Height	0.00065	0.000375	0.00189
		28-DAT Height ¹	<0.00030	0.000194	0.00138
		Yield ¹	<0.00030	0.0000623	0.00117
	Reproductive	14-DAT Height	0.0011	0.00156	0.00612
		28-DAT Height	0.00055	0.000613	0.00412
		Yield	0.00055	0.000245	0.00186

¹ Significant effects at all application rates, indicating lowest test concentration did not bracket effects at the lowest concentration range, and range of application rates was inadequate to accurately determine sensitivity to the test material.

Table 1b. Summary of Estimated Average % VSI at Endpoint Concentrations provided in Table 1a. (%)

Species	Stage	Endpoint*	NOAEC	EC ₀₅ /IC ₀₅	EC ₂₅ /IC ₂₅
Soybean	Vegetative Growth	14-DAT Height	23	18	33
		28-DAT Height	10	10	35
		Yield ^a	15 (14DAT) 10 (28DAT)	2 (14DAT) <5 (28DAT)	29 (14DAT) 33 (28DAT)
	Reproductive	14-DAT Height	30	30	45
		28-DAT Height	23	22	50
		Yield ^a	23 (14DAT) 23 (28DAT)	10 (14DAT) 9 (28DAT)	32 (14DAT) 38 (28DAT)

* Endpoints in Table 1a were used to a) provide the observed VSI at the NOAEC, and b) estimate the %VSI at height and yield IC_x endpoints using logistic regression equations fit to study reported VSI on 14-DAT and 28-DAT.

^a VSI was not assessed at the time of harvest, therefore %VSI for Yield is presented as the observed or predicted %VSI at 14DAT and 28DAT for the Yield endpoints in Table 1a.

Table 1c. Summary of most sensitive parameters (lb ae/A Glyphosate).

Species	Stage	Endpoint	NOAEC	EC ₀₅ /IC ₀₅	EC ₂₅ /IC ₂₅
Soybean	Vegetative Growth	14-DAT Height ¹	0.001	0.000593	0.00334
		28-DAT Height ¹	<0.00030	0.000268	0.00233
		Yield*	<0.00030	0.0000651	0.00186
	Reproductive	14-DAT Height ¹	0.0022	0.00329	0.0129
		28-DAT Height ¹	0.00094	0.00123	0.00889
		Yield*	0.00094	0.000431	0.0038

¹ Significant effects at all application rates, indicating lowest test concentration did not bracket effects at the lowest concentration range, and range of application rates was inadequate to accurately determine sensitivity to the test material.

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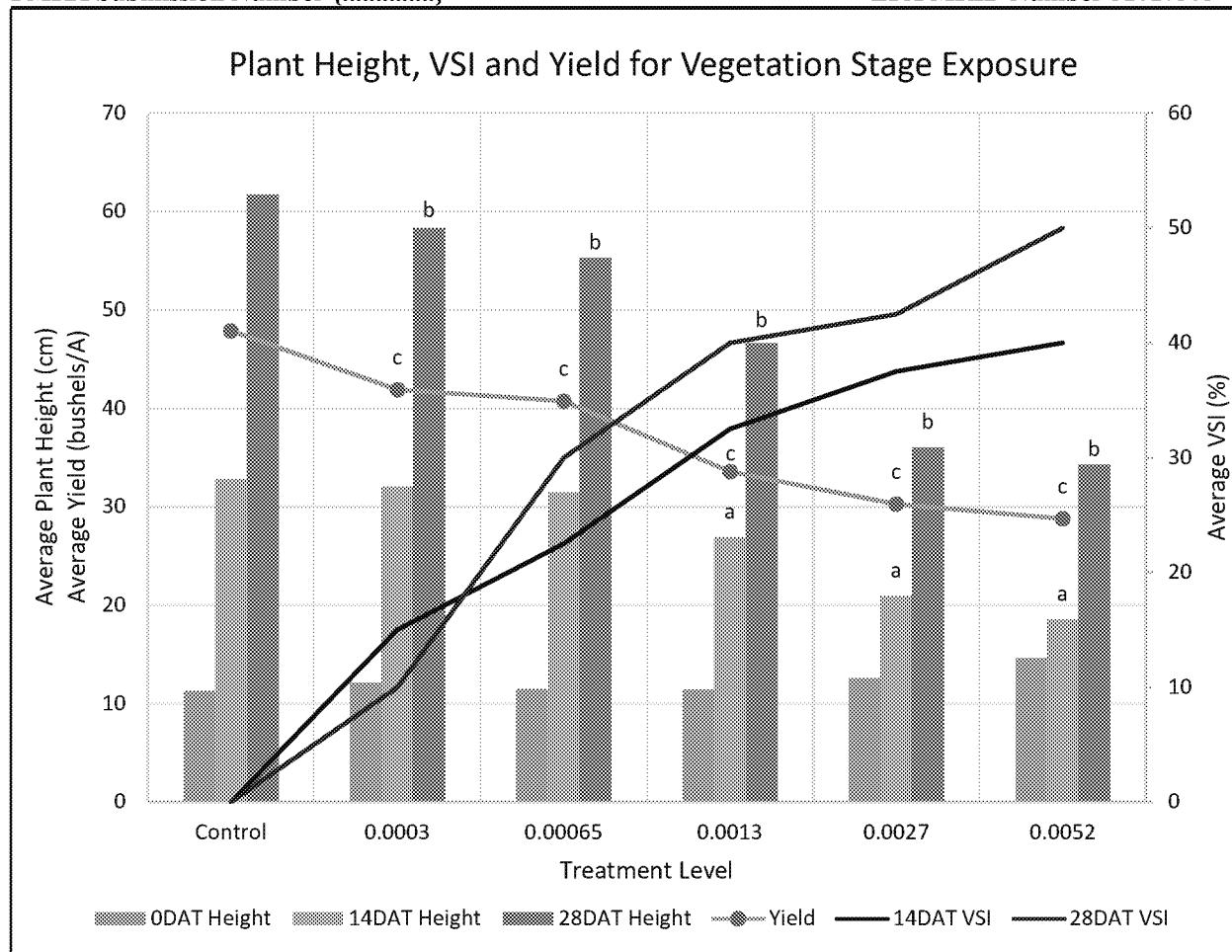


Figure 1: Relationship of plant height (Day 0, 14, 28), VSI (Day 14, 28) and yield (test termination) for the treatments applied during vegetative growth stages. Note: treatment levels with responses determined to be statistically different from the controls for day 14 height ("a"); day 28 height ("b"), and yield ("c") are indicated.

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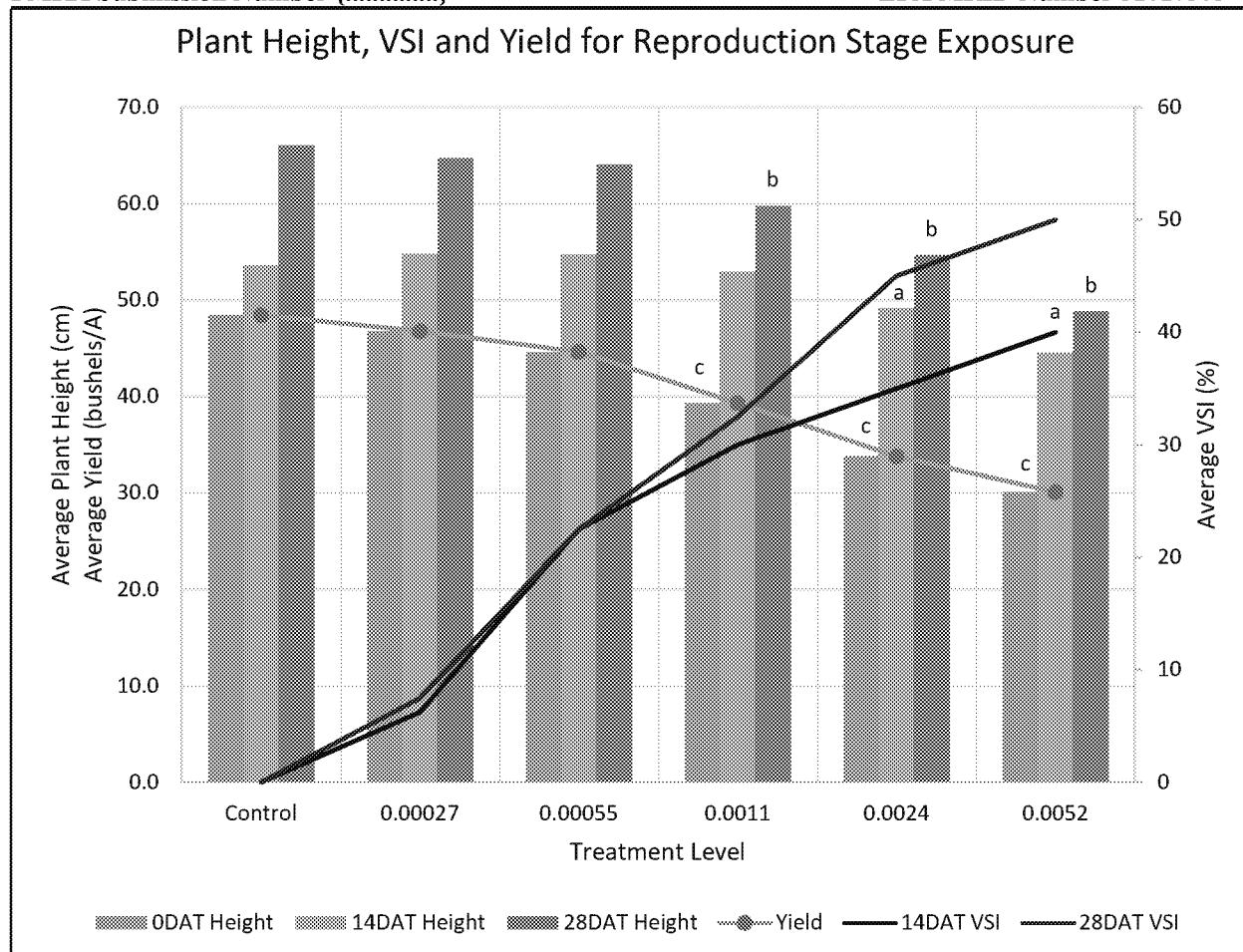


Figure 2: Relationship of plant height (Day 0, 14, 28), VSI (Day 14, 28) and yield (test termination) for the treatments applied during reproductive growth stages. Note: treatment levels with responses determined to be statistically different from the controls for day 14 height ("a"); day 28 height ("b"), and yield ("c") are indicated.

This study is scientifically sound and is classified as supplemental.

I. MATERIALS AND METHODS

GUIDELINE FOLLOWED:

This study was a non-guideline yield study. The reviewer evaluated the study methods according to OCSPP Guideline 850.4150: Vegetative Vigor. The following deviations were noted by the reviewer:

1. For both the vegetative growth and reproductive portions of the study, the study author measured the height of five plants "selected non-systematically" within each row of the two center rows in each replicate plot for a total of 10 plants prior to treatment, 14 DAT and 28/29 DAT (p. 20).

OCSPP guidance recommends that the integrity of the replicate should be maintained throughout the duration of the study. In this study, plant height was determined for ten different plants at each

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- measurement. The reviewer suggests that this sampling method is inadequate and introduces unnecessary variability into the study results that should have been more systematically controlled.
2. Control plots were located so that “no control plot was allowed to be adjacent to a plot receiving the highest application rate” (p. 15). The study authors assume there is no potential for drift to the control plots from the other lower applications.
- Likewise, the vegetative growth test field and the reproductive test fields were adjacent and separated by at least 20 ft (6 m). The wind was from the west to east with a speed of 1-5 mph (Table 5, p. 29). The study authors assume there is no potential for drift to the vegetative growth plots from the reproductive study spray application on August 15, 2019.
3. Significant effects were observed at all application rates for height and yield for the vegetative growth stage tests, indicating the lowest test concentration applied did not bracket the effects at the lowest concentration range. Therefore, the range of application rates was inadequate to accurately determine sensitivity to the test material.
4. “The soybean experiments were harvested at a single time, based on the maturity of plants in the control plots within each experiment” (p. 20). The maturity of the soybean crop at time of harvest was not reported or described.
5. No supplemental irrigation was applied during the study.
6. The following soil property details were not reported: percent sand, silt and clay, percent organic carbon, CEC and moisture at 1/3 atm.
7. The study author did not provide seed supplier information and historical germination rates for the soybean varieties planted.
8. Light intensity and humidity at the field test site were not determined. Daily observations of any moisture stress were also not reported.
9. Limits of detection (LOD) were not reported for HPLC-UV analysis.
10. The physico-chemical properties of the test materials were not reported.
11. The 35GA32 variety of soybean that was planted in the test plots for both the vegetative growth and reproductive study, is a non-Dicamba tolerant soybean. This variety was also selected because of its glyphosate-tolerance. It is uncertain if this genetically modified variety may have impacted dicamba effects compared to a non-genetically modified variety.

The deficiency and deviations did have an impact on the acceptability of this study.

COMPLIANCE: Signed and dated Good Laboratory Practices (GLP), Quality Assurance, and No Data Confidentiality statements were provided. This study was conducted in compliance with U.S. EPA 40 CFR Part 160 with the following exceptions: GPS coordinates, weather data, pesticide history, soil characterization, maintenance practices, equipment used for harvest, and MON 79789 was not logged per GLP for the mixing of the vegetative spray stock solutions.

A. MATERIALS:

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1. Test Material: Clarity® formulation (a.i. Dicamba DGA salt)
Roundup PowerMax® formulation (a.i. Glyphosate potassium salt)
Intact drift reduction agent (<0.005% (v/v))

Description: Not reported

Lot No./Batch No.: Not reported

Purity: 39.6% (w/w); 480 g/L (Dicamba)
39.74% (w/w); 540 g/L (Glyphosate)

Stability of compound under test conditions: Measured concentration of the test material in the tank mix yielded recoveries of 88-110% (n = 10) for dicamba DGA and 44-94% (n = 10) for glyphosate acid. Stability was not determined.
(OECD recommends chemical stability in water and light)

Storage conditions of test chemicals: Not reported

Table 2. Physical/chemical properties of Clarity® formulation (a.i. Dicamba DGA salt) + Roundup PowerMax® formulation (a.i. Glyphosate potassium salt)

Parameter	Values	Comments
Water solubility at 20°C	Not reported	
Vapor pressure	Not reported	
UV absorption	Not reported	
pKa	Not reported	
Kow	Not reported	

2. Test organism:

Dicotyledonous species: Soybean (*Glycine max*, Fabaceae; var. 35GA32 (Dicamba-non-tolerant and glyphosate-tolerant soybeans)

Seed source: Not reported

Prior plant treatment/sterilization: Not reported

Historical % germination of seed: Not reported

Seed storage, if any: Not reported

B. STUDY DESIGN:

1. Experimental Conditions

a. Limit test: None.

b. Range-finding study: None.

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c. Definitive Study

Table 3. Nominal and Analytically Confirmed Test Application Rates (lb ae/A) for Soybean.¹

Nominal Rates		Analytically Confirmed Rates of Dicamba Adjusted for Measured Field Application Rates ² (Percent of Nominal)	Analytically Confirmed Rates of Glyphosate Adjusted for Measured Field Application Rates ² (Percent of Nominal)
as Dicamba		Vegetative Growth Stage	
0 (negative control)	0 (negative control)	0 ³	0 ⁴
0.0003	0.000675	0.00030 (99)	0.00030 (44 ⁵)
0.0006	0.00135	0.00065 (106)	0.0010 (73)
0.0012	0.0027	0.0013 (110)	0.0022 (82)
0.0024	0.0054	0.0027 (109)	0.0049 (89)
0.0048	0.0108	0.0052 (107)	0.0096 (89)
		Reproductive Growth Stage	
0 (negative control)	0 (negative control)	0	0
0.0003	0.000675	0.00027 (88)	0.00040 (59 ⁵)
0.0006	0.00135	0.00055 (90)	0.00094 (69 ⁵)
0.0012	0.0027	0.0011 (92)	0.0022 (79)
0.0024	0.0054	0.0024 (95)	0.0052 (94)
0.0048	0.0108	0.0045 (91)	0.0094 (86)

Data obtained from Table 1, p. 25 and Tables 8-9, pp. 32-33 in the study report.

¹ Treatments were tank-mixes of dicamba (Clarity®), glyphosate (Roundup PowerMax®), and Intact™, a drift reduction agent. Measured tank-mix concentrations for dicamba were 99.3-110.1% and 87.4-94.5% of nominal concentrations for the vegetative and reproductive experiments, respectively. Glyphosate concentrations were 43.8-89% and 58.6-94.4% of nominal concentrations for the vegetative and reproductive experiments, respectively (Table 7, p. 31).

² Measured tank concentrations were adjusted for measured field application rates (% of target GPA), and recoveries shown are based on analytical recoveries and field application rate recoveries and are rounded rates (DER Attachment 1).

³ Limit of quantitation (LOQ) 2 mg/L.

⁴ Limit of quantitation (LOQ) 4 mg/L.

⁵ Recoveries were outside the acceptable range of 70-120%; the analytical report (Appendix 2, pp. 51-114) did not provide a reason for low recoveries.

Table 4: Experimental Parameters – Soybean Yield.

Parameters	Soybean Yield	
	Details	Remarks
		Criteria
Duration of the test	28 days for each experiment	Plants were exposed at two different growth stages: early vegetative (V3) and reproductive at flowering (R1).

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Number of seeds/plants/species/replicate	10 plants/replicate	Soybeans were planted on 30-inch row spacing and 1.5-inch plant spacing. No effort was made to maintain the replicate. Plants measured for height were not tracked and therefore were not consistently evaluated across the sampling periods
Number of plants retained after thinning	Thinning not reported.	
<u>Number of replicates</u> Control: Adjuvant control: Treated:	4 N/A 4	
Number of test concentrations:	Five low dose tank-mix application (Treatments 1-5) and one negative control (Treatment 0; tank-mix water)	Stock solutions (1:100 dilutions) of Clarity®, Roundup PowerMax®, and Intact™ were prepared and used to individually mix each treatment.
<u>Method and interval of analytical verification</u> LOQ: LOD:	Tank-mix samples were collected and analyzed using HPLC with UV detection for dicamba DGA (220 nm) and glyphosate (500 nm). 0.00028 lb ae/A (dicamba) 0.00056 lb ae/A (glyphosate) Not reported	
Adjuvant (type, percentage, if used)	Intact™ (Polyethylene glycol, choline chloride, guar gum), 0.5% v/v	
<u>Test container (plot)</u> Size/Volume:	Each treatment area was arranged as a randomized complete block (RCB) design. Each plot had 12 rows, with row spacing of 30 inches and row length of 20 ft.	Alleys between replicates (20 ft wide) were continuously planted with soybeans. Soybean borders (20 ft) surrounded both experimental plots. No control plot was allowed to be adjacent to a plot receiving the highest application rate.

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Material: (glass/polystyrene)	The center four rows were treated, for a total treated area of 196.8 ft ² . Not applicable	
Growth facility	Soybean field located in Stewardson, Illinois	
Method/depth of seeding	Soybeans were planted on July 11, 2019 for both experiments. The method of planting was not reported.	Prior to planting, a proper seedbed was prepared according to local agronomic practices, including tillage and herbicide applications.
<u>Test material application</u> Application time including the plant growth stage	Early vegetative growth stage: V3 Flowering reproductive stage: R1	Applicates dates were 8/5/2019 for the vegetative growth stage and 8/15/2019 for the reproductive stage.
Number of applications	Single application, applied in 2 passes	
Application interval	N/A- single application for each experiment	
Method of application	The test material was applied using a backpack sprayer (CO ₂ propellant) with two TeeJet® TTI nozzles spaced 29.5 inches apart. Treatments were applied with a boom height of 20 inches and travel speed of 3.87 mph (vegetative stage) and 3.67 mph (reproductive stage). The target application rate for each experiment was 10-20 gallons per acre (GPA).	
<u>Details of soil used</u> Geographic location Depth of soil collection Soil texture % sand % silt % clay pH: % organic carbon CEC (meq/100g) Moisture at 1/3 atm (%)	Stewardson, Illinois Not applicable Silt loam Not reported Not reported Not reported 6 Not reported Not reported Not reported	Organic matter: 2% Previous crop: corn . .
Details of nutrient medium, if used	Not applicable	

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<u>Watering regime and schedules</u>	None Not applicable Not applicable Not applicable	Rainfall during the yield study was not reported. The reviewer obtained partial rainfall data from MRID 51017502 (Table 11, pp. 121-122) where rainfall was collected from 8/7/19 to 9/5/19. According to this data, cumulative precipitation was 6.26 inches from 8/7/19 to 9/5/19. See Reviewer's Comments for further details.
<u>Any pest control method/fertilization, if used</u>	<u>Pre-plant Herbicides</u> 6/14/2019 – Valor EZ® (2.5 fl oz/A)	
<u>Test conditions</u>	Vegetative growth stage: 88.0°F Reproductive stage: 81.0°F Vegetative growth stage: 90.0°F Reproductive stage: 88.0°F Vegetative growth stage: 86.0°F Reproductive stage: 86.0°F Not applicable; the study was conducted outside. Not measured Vegetative growth stage: 70% Reproductive stage: 53%	Only mean temperature and relative humidity data were reported. The reviewer was able to obtain partial ranges for temperature and relative humidity from MRID 51017502 (Tables 11-12, pp. 121-124) for dates ranging from 8/7/19 to 9/5/19. According to this data, ranges were the following: Temperature (air): Vegetative growth stage: 55.8-89.6°F Reproductive stage: 55.0-89.6°F Temperature (soil at 2 in): Vegetative growth stage: 65.5-89.4°F Reproductive stage: 65.5-86.9°F Relative humidity: Vegetative growth stage: 44-100% Reproductive stage: 55-100% See Reviewer's Comments for further details. 0% cloud cover for vegetative growth stage and 20% cloud cover for reproductive stage.
<u>Reference chemical (if used)</u> Name: Concentrations: Other parameters, if any	N/A	

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Other parameters, if any	None	
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2. Observations:

Table 5: Observation Parameters – Soybean Yield.

Parameters	Vegetative Vigor	
	Details	Remarks
Parameters measured (e.g., number of germinated seeds, emerged seedlings, plant height, fresh weight or other endpoints)	Plant height Yield Visual Morphology	
Measurement technique for each parameter	Plant height was measured for 10 non-systematically selected plants from the 2 center rows in the treated areas of each plot. Plant height was measured from the soil surface to the tip of the newest emerging apical bud (leaf) of the main stem. Morphology was visually determined as an aggregate across all plants within the center two treated rows of each plot. Yield was calculated based on the actual weight of soybeans harvested from two rows (100 ft ²) and the measured moisture content of the harvested soybeans.	Plots were harvested using a combine.
Observation intervals	Plant height and visual morphology were assessed for each treatment on the day of treatment (Day 0), or up to one day before treatment (Day -1), and at Days 14 and 28.	
Other observations, if any	N/A	
Were raw data included?	Yes	
Phytotoxicity rating system, if used	0-5 no effect; 10-30 slight effect; 40-60 moderate effect; 70-90 severe effect; 100- complete effect (dead plant)	

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II. RESULTS and DISCUSSION:

A. INHIBITORY EFFECTS:

When compared to the negative control, the reviewer found significant inhibitions in soybean plant height for both the vegetative growth and reproductive stages (Tables 6c and 6d). For the vegetative growth stage, significant inhibitions in soybean height were found at 0.0003 lb ae dicamba/A and 0.000675 lb ae glyphosate/A and higher (all test concentrations), compared to the negative control (Williams Multiple Comparison test, $p<0.05$). For the reproductive stage, significant inhibitions in soybean height were found at 0.0012 lb ae dicamba/A and 0.0027 lb ae glyphosate/A and higher, compared to the negative control (Williams Multiple Comparison test, $p<0.05$).

The study author did not report inhibitions in height but did identify treatment levels with significant differences between treatment effects and the control, based on an overall F test ($\alpha = 0.05$). The study author found significant inhibitions in soybean height for the vegetative growth stage at 0.0006 lb ae dicamba/A and 0.00135 lb ae glyphosate/A and higher, whereas the reviewer found significant inhibitions at all treatment levels. For the reproductive study, the study author and reviewer found significant inhibitions in height at the same treatment levels.

Table 6c: Percent Inhibition of Plant Height- Vegetative Growth Stage.

Nominal Rate lb ae/A		Percent Inhibition ¹
Clarity® (a.i. Dicamba) ²	Roundup PowerMax® (a.i. Glyphosate) ³	Soybean
0.0003	0.000675	6 ^{4*}
0.0006	0.00135	10 [*]
0.0012	0.0027	24 [*]
0.0024	0.0054	42 [*]
0.0048	0.0108	44 [*]

¹ Treatment groups compared to the negative control.

² The measured, adjusted for field application rates were 0.00030, 0.00065, 0.0013, 0.0027, and 0.0052 lb ae/A.

³ The measured, adjusted for field application rates were 0.00030, 0.0010, 0.0022, 0.0049, and 0.0096 lb ae/A.

⁴ The study author did not consider percent inhibitions at these treatment levels as statistically significant.

* Statistically significant when compared to the negative control.

Table 6d: Percent Inhibition of Plant Height- Reproductive Stage.

Nominal Rate lb ae/A		Percent Inhibition ¹
Clarity® (a.i. Dicamba) ²	Roundup PowerMax® (a.i. Glyphosate) ³	Soybean
0.0003	0.000675	2
0.0006	0.00135	3
0.0012	0.0027	9 [*]
0.0024	0.0054	17 [*]
0.0048	0.0108	26 [*]

¹ Treatment groups compared to the negative control.

² The measured, adjusted for field application rates were 0.00027, 0.00055, 0.0011, 0.0024, and 0.0045 lb ae/A.

³ The measured, adjusted for field application rates were 0.00040, 0.00094, 0.0022, 0.0052, and 0.0094 lb ae/A.

* Statistically significant when compared to the negative control.

When compared to the negative control, the reviewer found significant inhibitions in soybean yield for both the vegetative growth and reproductive stages (Tables 6e and 6f). For the vegetative growth stage,

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significant inhibitions in soybean yield were found at 0.0003 lb ae dicamba/A and 0.000675 lb ae glyphosate/A and higher (all test concentrations), compared to the negative control (Williams Multiple Comparison test, p<0.05). For the reproductive stage, significant inhibitions in soybean yield were found at 0.0012 lb ae dicamba/A and 0.0027 lb ae glyphosate/A and higher, compared to the negative control (Williams Multiple Comparison test, p<0.05).

The study author did not report inhibitions in yield but did identify treatment levels with significant differences between treatment effects and the control, based on an overall F test ($\alpha = 0.05$). The study author found significant inhibitions in soybean yield for the vegetative growth stage at 0.0012 lb ae dicamba/A and 0.0027 lb ae glyphosate/A and higher, whereas the reviewer found significant inhibitions at all treatment levels. For the reproductive study, the study author found significant inhibitions in soybean yield at 0.0024 lb ae dicamba/A and 0.0054 lb ae glyphosate/A and higher, whereas the reviewer found significant inhibitions at 0.0012 lb ae dicamba/A and 0.0027 lb ae glyphosate/A and higher.

Table 6e: Percent Inhibition of Plant Yield- Vegetative Growth Stage.

Nominal Rate lb ae/A		Percent Inhibition ¹
Clarity® (a.i. Dicamba) ²	Roundup PowerMax® (a.i. Glyphosate) ³	Soybean
0.0003	0.000675	12 ^{4*}
0.0006	0.00135	15 ^{4*}
0.0012	0.0027	30*
0.0024	0.0054	37*
0.0048	0.0108	40*

¹ Treatment groups compared to the negative control.

² The measured, adjusted for field application rates were 0.00030, 0.00065, 0.0013, 0.0027, and 0.0052 lb ae/A.

³ The measured, adjusted for field application rates were 0.00030, 0.0010, 0.0022, 0.0049, and 0.0096 lb ae/A.

⁴ The study author did not consider percent inhibitions at these treatment levels as statistically significant.

* Statistically significant when compared to the negative control.

Table 6f: Percent Inhibition of Plant Yield- Reproductive Stage.

Nominal Rate lb ae/A		Percent Inhibition ¹
Clarity® (a.i. Dicamba) ²	Roundup PowerMax® (a.i. Glyphosate) ³	Soybean
0.0003	0.000675	3
0.0006	0.00135	8
0.0012	0.0027	19 ^{4*}
0.0024	0.0054	30*
0.0048	0.0108	38*

¹ Treatment groups compared to the negative control.

² The measured, adjusted for field application rates were 0.00027, 0.00055, 0.0011, 0.0024, and 0.0045 lb ae/A.

³ The measured, adjusted for field application rates were 0.00040, 0.00094, 0.0022, 0.0052, and 0.0094 lb ae/A.

⁴ The study author did not consider percent inhibitions at these treatment levels as statistically significant.

* Statistically significant when compared to the negative control.

The phytotoxic symptoms noted included leaf cupping, epinasty of both stems and petioles, and some stunting and were readily apparent at all application rates in soybean plants in the vegetative growth study after 28 days. In the reproductive stage study, new growth leaves were cupped and some pods were curled in addition to compression of the main stem internodes on Day 28. Phytotoxic symptoms were seen up to moderate levels and showed a dose-dependent response in both the vegetative growth study and the reproductive study.

Data Evaluation Record on the Toxicity of Dicamba DGA salt and Glyphosate potassium salt to Terrestrial Vascular Plants: Soybean Yield

PMRA Submission Number {.....}

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B. REPORTED STATISTICS:

For each experiment, ANOVA was conducted separately for each variable and time-point according to a randomized complete block design using SAS®. Comparisons of each treatment to the water-only control were defined within the ANOVA and tested using Dunnett's test. A two-parameter logistic model was used to estimate an EC₂₅ and an EC₅₀ for plant height and yield if the overall F-test for a variable and time-point was significant ($\alpha=0.05$).

Table 7a: Effect of Clarity® (a.i. Dicamba DGA salt) + Roundup PowerMax® (a.i. Glyphosate potassium salt) on 28-Day Soybean Yield- Vegetative Growth Stage.

Species	Results summary for height (lb ae/A Dicamba)									
	height (cm)	NOAEC	EC ₀₅	95% CI	EC ₂₅	95% CI	EC ₅₀	95% CI	slope	95%CI
Soybean	34.30-61.75	0.0003	ND	N/A	0.0014	ND	0.0050	ND	N/A	N/A

ND- Not determined. N/A- Not applicable.

Table 7b: Effect of Clarity® (a.i. Dicamba DGA salt) + Roundup PowerMax® (a.i. Glyphosate potassium salt) on 28-Day Soybean Yield - Reproductive Stage.

Species	Results summary for height (lb ae/A Dicamba)									
	height (cm)	NOAEC	EC ₀₅	95% CI	EC ₂₅	95% CI	EC ₅₀	95% CI	slope	95% CI
Soybean	48.88-66.03	0.0006	ND	N/A	0.0044	ND	0.0137	ND	N/A	N/A

ND- Not determined. N/A- Not applicable.

Table 7c: Effect of Clarity® (a.i. Dicamba DGA salt) + Roundup PowerMax® (a.i. Glyphosate potassium salt) on 28-Day Soybean Yield - Vegetative Growth Stage.

Species	Results summary for yield (lb ae/A Dicamba)									
	yield (kg/ha)	NOAEC	EC ₀₅	95% CI	EC ₂₅	95% CI	EC ₅₀	95% CI	slope	95% CI
Soybean	1936-3220	0.0006	ND	N/A	0.0011	ND	0.0079	ND	N/A	N/A

ND- Not determined. N/A- Not applicable.

Data Evaluation Record on the Toxicity of Dicamba DGA salt and Glyphosate potassium salt to Terrestrial Vascular Plants: Soybean Yield

PMRA Submission Number {.....}

EPA MRID Number 51017505

Table 7d: Effect of Clarity® (a.i. Dicamba DGA salt) + Roundup PowerMax® (a.i. Glyphosate potassium salt) on 28-Day Soybean Yield - Reproductive Growth Stage.

Species	Results summary for yield (lb ae/A Dicamba)									
	yield (kg/ha)	NOAEC	EC ₀₅	95% CI	EC ₂₅	95% CI	EC ₅₀	95% CI	slope	95% CI
Soybean	2025-3257	0.0012	ND	N/A	0.0021	ND	0.0076	ND	N/A	N/A

ND- Not determined. N/A- Not applicable.

28-Day Mean Visual Injury Rating			
Nominal Rate lb ae/A		Vegetative Growth Stage (%)	Reproductive Stage (%)
Clarity® (a.i. Dicamba DGA) ¹	Roundup PowerMax® (a.i. Glyphosate acid) ²		
0 (negative control)	0 (negative control)	0.0	0.0
0.0003	0.000675	10.0*	7.5*
0.0006	0.00135	30.0*	22.5*
0.0012	0.0027	40.0*	32.5*
0.0024	0.0054	42.5*	45.0*
0.0048	0.0108	50.0*	50.0*

¹ The measured, adjusted for field application rates were 0.00030, 0.00065, 0.0013, 0.0027, and 0.0052 lb ae dicamba/A and 0.00030, 0.0010, 0.0022, 0.0049, and 0.0096 lb ae glyphosate/A for the vegetative growth stage.

² The measured, adjusted for field application rates were 0.00027, 0.00055, 0.0011, 0.0024, and 0.0045 lb ae dicamba/A and 0.00040, 0.00094, 0.0022, 0.0052, and 0.0094 lb ae glyphosate/A for the reproductive stage.

* Reported by the study author to be significantly greater than the control, according to the Nemenyi test.

Data Evaluation Record on the Toxicity of Dicamba DGA salt and Glyphosate potassium salt to Terrestrial Vascular Plants: Soybean Yield

PMRA Submission Number {.....}

EPA MRID Number 51017505

C. VERIFICATION OF STATISTICAL RESULTS BY THE REVIEWER:

All analyses were conducted comparing treated to the negative control. These analyses were conducted using CETIS version 1.9.5.3 with database backend settings implemented by EFED on 7/25/2017. Data for each endpoint were tested to determine if their distributions were normal and if their variances were homogeneous using Shapiro-Wilk's and Levene's tests, respectively. Data that satisfied these assumptions were subjected to Dunnett's and William's tests, and data that did not satisfy these assumptions were subjected to the non-parametric Mann-Whitney U and Jonckheere's tests. Linear (survival) and nonlinear (height and weight (yield)) regression models were used to interpret EC/IC_x values. Measured concentrations, adjusted for field application rates, were used for all statistical analyses. The results of 28DAT Plant Height, Yield and %VSI are provided in the tables below. The complete statistics evaluation and 14DAT results are provided in the CETIS output pages at the back of this DER.

Data Evaluation Record on the Toxicity of Dicamba DGA salt and Glyphosate potassium salt to Terrestrial Vascular Plants: Soybean Yield

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EPA MRID Number 51017505

Table 8a: Effect of Clarity® (a.i. Dicamba DGA salt) + Roundup PowerMax® (a.i. Glyphosate potassium salt) on 28-Day Soybean Yield- Vegetative Growth Stage.

Species	Results summary for height (lb ae/A Dicamba)									
	height (cm)	NOAEC	IC ₀₅	95% CI	IC ₂₅	95% CI	IC ₅₀	95% CI	slope	95% CI
Soybean*	34.3-61.8	<0.00030	0.000194	7.02E-05-0.000332	0.00138	0.00112-0.00167	0.00539	0.00421-0.0069	N/A	N/A
Results summary for height (lb ae/A Glyphosate)										
Species	height (cm)	NOAEC	IC ₀₅	95% CI	IC ₂₅	95% CI	IC ₅₀	95% CI	slope	95% CI
	34.3-61.8	<0.00030	0.000268	0.000093-0.000477	0.00233	0.00185-0.00289	0.0105	0.00797-0.0138	N/A	N/A

N/A- Not applicable.

*Endpoints and/or confidence intervals are outside tested range of concentrations and should be interpreted with caution.

Table 8c: Effect of Clarity® (a.i. Dicamba DGA salt) + Roundup PowerMax® (a.i. Glyphosate potassium salt) on 28-Day Soybean Yield- Vegetative Growth Stage.

Species	Results summary for yield (lb ae/A Dicamba)									
	Yield (kb/ha)	NOAEC	IC ₀₅	95% CI	IC ₂₅	95% CI	IC ₅₀	95% CI	slope	95% CI
Soybean*	1940-3220	<0.00030	0.0000623	N/A-0.000252	0.00117	0.000711-0.00182	0.00895	0.00392-0.0204	N/A	N/A
Results summary for yield (lb ae/A Glyphosate)										
Species	yield (kg/ha)	NOAEC	IC ₀₅	95% CI	IC ₂₅	95% CI	IC ₅₀	95% CI	slope	95% CI
	1940-3220	<0.00030	0.0000651	N/A-0.000319	0.00186	0.00105-0.00312	0.0191	0.0073-0.0502	N/A	N/A

N/A- Not applicable.

*Endpoints and/or confidence intervals are outside tested range of concentrations and should be interpreted with caution.

Data Evaluation Record on the Toxicity of Dicamba DGA salt and Glyphosate potassium salt to Terrestrial Vascular Plants: Soybean Yield

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Table 9a: Effect of Clarity® (a.i. Dicamba DGA salt) + Roundup PowerMax® (a.i. Glyphosate potassium salt) on 28-Day Soybean Yield- Reproductive Stage.

Species	Results summary for height (lb ae/A Dicamba)									
	height (cm)	NOAEC	IC ₀₅	95% CI	IC ₂₅	95% CI	IC ₅₀	95% CI	slope	95% CI
Soybean*	48.9-66	0.00055	0.000613	0.000412-0.000825	0.00412	0.00351-0.00479	0.0155	0.0101-0.0239	N/A	N/A
Results summary for height (lb ae/A Glyphosate)										
Species	height (cm)	NOAEC	IC ₀₅	95% CI	IC ₂₅	95% CI	IC ₅₀	95% CI	slope	95% CI
	48.9-66	0.00094	0.00123	0.000795-0.0017	0.00889	0.00751-0.0104	0.0351	0.0219-0.0563	N/A	N/A

N/A- Not applicable.

*Endpoints and/or confidence intervals are outside tested range of concentrations and should be interpreted with caution.

Table 9c: Effect of Clarity® (a.i. Dicamba DGA salt) + Roundup PowerMax® (a.i. Glyphosate potassium salt) on 28-Day Soybean Yield- Reproductive Stage.

Species	Results summary for yield (lb ae/A Dicamba)									
	yield (kg/ha)	NOAEC	IC ₀₅	95% CI	IC ₂₅	95% CI	IC ₅₀	95% CI	slope	95% CI
Soybean*	2020-3260	0.00055	0.000245	N/A-0.000587	0.00186	0.00124-0.00266	0.00762	0.00372-0.0156	N/A	N/A
Results summary for yield (lb ae/A Glyphosate)										
Species	yield (kg/ha)	NOAEC	IC ₀₅	95% CI	IC ₂₅	95% CI	IC ₅₀	95% CI	slope	95% CI
	2020-3260	0.00094	0.000431	N/A-0.0011	0.0038	0.00246-0.00559	0.0173	0.00787-0.038	N/A	N/A

N/A- Not applicable.

*Endpoints and/or confidence intervals are outside tested range of concentrations and should be interpreted with caution.

Data Evaluation Record on the Toxicity of Dicamba DGA salt and Glyphosate potassium salt to Terrestrial Vascular Plants: Soybean Yield

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Evaluation of Visual Signs of Injury (%VSI)

VSI was evaluated using logistic regression in Excel fit to observed VSI for each test dose. No hypothesis testing was evaluated to establish NOAEC/LOAEC endpoints. Regression equations provided in Figures 3 and 4 were used to estimate the %VSI for regression based IC_x values for plant height and yield. See Table 1b in the executive summary for the results of these estimation procedures.

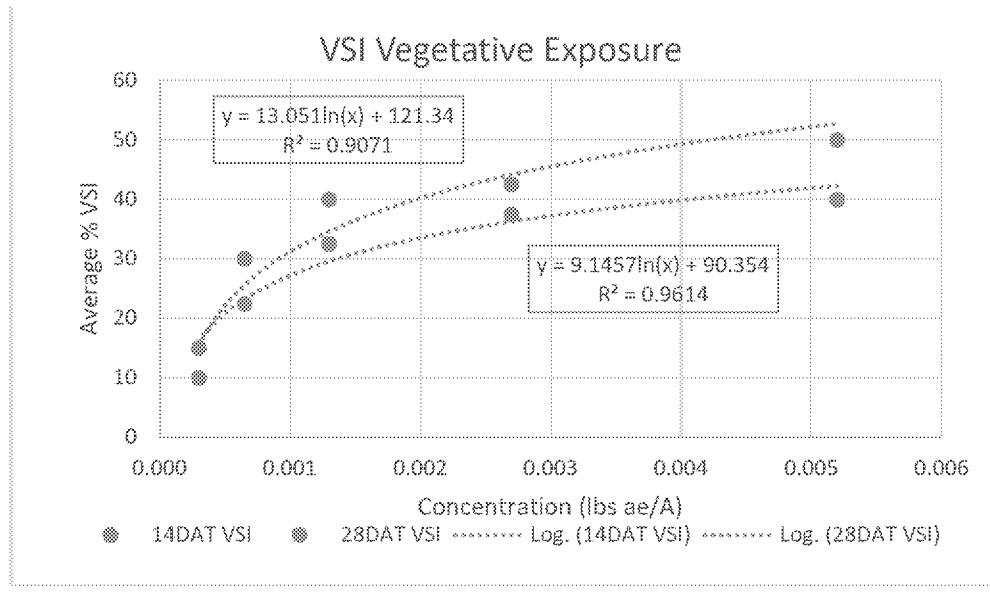


Figure 3. Logistic regression of %VSI for 14DAT and 28DAT observations of %VSI after a vegetative growth stage exposure.

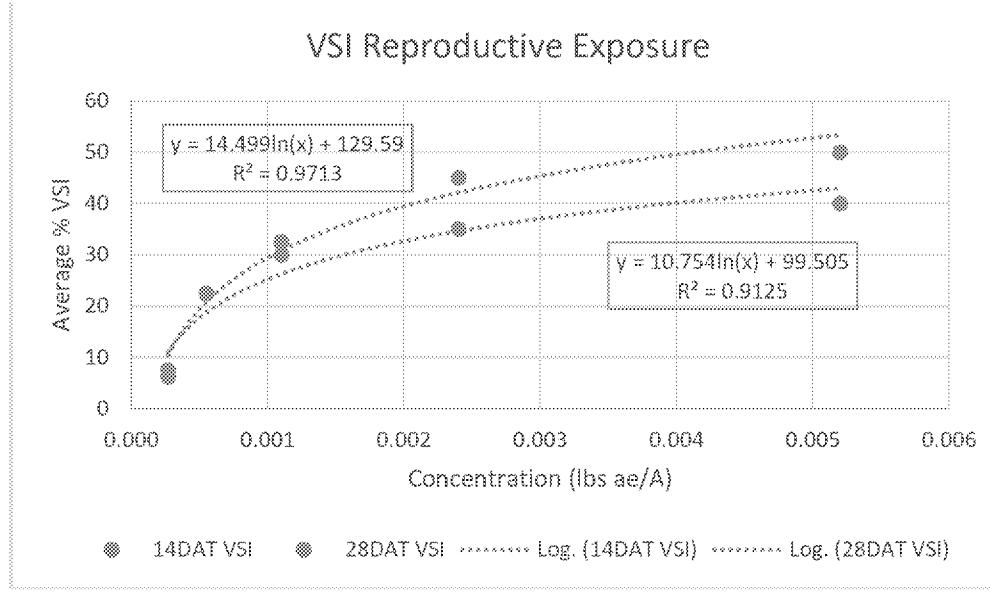


Figure 4. Logistic regression of %VSI for 14DAT and 28DAT observations of %VSI after a reproductive growth stage exposure.

Data Evaluation Record on the Toxicity of Dicamba DGA salt and Glyphosate potassium salt to Terrestrial Vascular Plants: Soybean Yield

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D. STUDY DEFICIENCIES:

See provided list above

E. REVIEWER'S COMMENTS:

The most endpoint was yield in the vegetative growth stage, with NOAEC and IC₂₅ values of <0.00030 and 0.00117 lb ae/A dicamba, respectively (corresponding to a NOAEC and IC₂₅ of <0.00030 and 0.00186 lb ae/A glyphosate, respectively). Significant response of VSI was observed for all test exposure concentrations and for both vegetative and reproduction growth stages.

Differences between the study author and reviewer's results resulted from differences in statistical methods (hypothesis tests) and the study author analyzing nominal test concentrations while the reviewer analyzed measured test concentrations.

MRID 51017502 provided precipitation, temperature, and relative humidity data from 8/7/19 to 9/5/19 for the same location/site that also conducted the yield study. However, the yield study soybean crop was planted on 7/11/19 and application of test material occurred on 8/5/19 for the vegetative growth stage and 8/15/19 for the reproductive stage; the yield study was then conducted for 28 days from the time of application. Therefore, weather data was not reported for portions of the yield study.

Application dates for the vegetative growth and reproductive stages were August 5, 2019 and August 15, 2019, respectively.

F. CONCLUSIONS:

See executive summary for reviewer's conclusions.

This study is scientifically sound and is classified as supplemental

III. REFERENCES:

- Ahrens, W.H. 1994. Dicamba. 3,6-dichloro-2-methoxybenzoic acid. Pages 91-94 in Herbicide Handbook. Seventh Edition. Weed Science Society of America, Champaign, Illinois.
- BASF Corporation. 2010. Clarity® herbicide label. BASF Corporation, Research Triangle Park, North Carolina.
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- Grossmann, K. 2010. Auxin herbicides: Current status of mechanism and mode of action. Pest Management Science 66:113-120.
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Data Evaluation Record on the Toxicity of Dicamba DGA salt and Glyphosate potassium salt to Terrestrial Vascular Plants: Soybean Yield

PMRA Submission Number {.....}

EPA MRID Number 51017505

Porch, J. R., H.O. Kreugger, T.Z. Kendall, C. Holmes. 2009. BAS 183 09 H (Clarity): A Toxicity Test to Determine the Effects of the Test Substance on Seedling Emergence of Ten Species of Plants. BASF Study No: 358585.

Weidenhamer, J.D., G.B. Triplett and F.E. Sobotka. 1989. Dicamba injury to soybean. Agronomy Journal 81:637-643.

ATTACHMENT 1. OUTPUT OF REVIEWER'S STATISTICAL VERIFICATION



128931+
51017505_CETIS_9-2

ATTACHMENT 2. APPLICATION RATES, CONVERSIONS AND RAW DATA EXCEL FILE



Copy%20of%20Laboratory%20Phytotoxicity%20Study%20Report%20for%20Dicamba%20DGA%20salt%20and%20Glyphosate%20potassium%20salt%20to%20Terrestrial%20Vascular%20Plants%20-%20Soybean%20Yield%20-%20BASF%20Study%20No%20358585%20-%20EMD%20-%20Data%20Evaluation%20Record%20-%20Version%201%20-%20Final%20-%20128931%20-%2051017505_CETIS_9-2.xlsx

CETIS Summary Report

Report Date: 06 Apr-20 18:49 (p 1 of 2)
 Test Code/ID: 51017505 direpr / 19-8782-5625

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Batch ID:	00-5365-1199	Test Type:	Vegetative Vigor Tier II	Analyst:	
Start Date:	15 Aug-19	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:	
Ending Date:		Species:	Glycine max	Brine:	
Test Length:	n/a	Taxon:		Source:	Age: R1
Sample ID:	14-5402-4357	Code:	51017505 direpr	Project:	
Sample Date:	15 Aug-19	Material:	Dicamba DGA	Source:	Monsanto Company
Receipt Date:		CAS (PC):		Station:	
Sample Age:	n/a	Client:	CDM Smith - K. Bozicevich		

128931 51017505; Soybean yield; Reproductive (R1)

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓ NOEL	LOEL	TOEL	TU	PMSD	S
16-2182-8057	Height	Dunnett Multiple Comparison Test	✓ 0.00055	0.0011	0.0007778		5.21%	1
04-8748-3380	Height	Williams Multiple Comparison Test	✓ 0.00055	0.0011	0.0007778		4.04%	1
05-1677-4265	Weight	Dunnett Multiple Comparison Test	✓ 0.00055	0.0011	0.0007778		18.5%	1
17-1725-1994	Weight	Williams Multiple Comparison Test	✓ 0.00055	0.0011	0.0007778		14.3%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓ Level	Ibs ae/A	95% LCL	95% UCL	TU	S
12-6756-2876	Height	NLR: 3P Cum Log-Normal (Probit)	IC5	0.000613	0.000412	0.000825		1
			IC10	0.00125	0.000989	0.00153		
			IC25	0.00412	0.00351	0.00479		
			IC50	0.0155	0.0101	0.0239		
09-8237-4160	Weight	NLR: 3P Cum Log-Normal (Probit)	✓ IC5	0.000245	n/a	0.000587		1
			✓ IC10	0.000523	0.000182	0.000977		
			✓ IC25	0.00186	0.00124	0.00266		
			✓ IC50	0.00762	0.00372	0.0156		

Height Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	66	62.8	69.2	64.6	69	1	2.01	3.04%	0.00%
0.00027		4	64.7	62.3	67.1	62.5	65.8	0.752	1.5	2.32%	1.97%
0.00055		4	64.1	58.7	69.5	59.5	67.3	1.7	3.41	5.31%	2.92%
0.0011		4	59.8	56.9	62.7	58.3	62.5	0.925	1.85	3.09%	9.43%
0.0024		4	54.6	52.3	57	52.5	56	0.753	1.51	2.76%	17.23%
0.0045		4	48.9	47.3	50.4	48	49.9	0.484	0.967	1.98%	25.98%

Weight Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	3260	2810	3710	2910	3520	142	284	8.71%	0.00%
0.00027		4	3150	2730	3560	2760	3290	130	259	8.23%	3.39%
0.00055		4	3000	2370	3640	2560	3340	200	399	13.30%	7.83%
0.0011		4	2650	1970	3330	2070	3090	213	427	16.13%	18.75%
0.0024		4	2270	1810	2730	2070	2700	145	289	12.71%	30.17%
0.0045		4	2020	1360	2690	1430	2410	210	419	20.71%	37.85%

CETIS Summary ReportReport Date: 06 Apr-20 18:49 (p 2 of 2)
Test Code/ID: 51017505 direpr / 19-8782-5625**OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)****Syntech Research, Inc.****Height Detail**

Conc-lbs ae/A	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	65.3	65.2	64.6	69
0.00027		62.5	65.4	65.8	65.2
0.00055		59.5	63.7	65.9	67.3
0.0011		59.2	62.5	59.2	58.3
0.0024		55.2	52.5	54.9	56
0.0045		48.1	49.5	49.9	48

Weight Detail

Conc-lbs ae/A	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	2910	3150	3450	3520
0.00027		2760	3250	3290	3290
0.00055		2560	2760	3340	3340
0.0011		2660	3090	2760	2070
0.0024		2110	2700	2220	2070
0.0045		2110	2160	2410	1430

CETIS Summary Report

Report Date: 06 Apr-20 19:04 (p 1 of 2)
 Test Code/ID: 51017505 diveg / 13-0757-3698

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Batch ID:	20-1949-4057	Test Type:	Vegetative Vigor Tier II	Analyst:	
Start Date:	05 Aug-19	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:	
Ending Date:		Species:	Glycine max	Brine:	
Test Length:	n/a	Taxon:		Source:	Age: V3
Sample ID:	17-1688-0481	Code:	51017505 diveg	Project:	
Sample Date:	05 Aug-19	Material:	Dicamba DGA	Source:	Monsanto Company
Receipt Date:		CAS (PC):		Station:	
Sample Age:	n/a	Client:	CDM Smith - K. Bozicevich		

128931 51017505; Soybean yield; Vegetative Growth (V3)

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓ NOEL	LOEL	TOEL	TU	PMSD	S
18-6521-9080	Height	Dunnett Multiple Comparison Test	0.0003	0.00065	0.0004416		7.67%	1
09-9816-8832	Height	Williams Multiple Comparison Test	✓ <0.0003	0.0003	n/a		5.95%	1
01-3472-1028	Weight	Dunnett Multiple Comparison Test	0.00065	0.0013	0.0009192		16.4%	1
08-5942-0619	Weight	Williams Multiple Comparison Test	✓ <0.0003	0.0003	n/a		12.7%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓ Level	Ibs ae/A	95% LCL	95% UCL	TU	S
08-0873-3807	Height	NLR: 3P Cum Log-Normal (Probit)	IC5	0.000194	7.02E-05	0.000332		1
			IC10	0.000404	0.000255	0.000575		
			IC25	0.00138	0.00112	0.00167		
			✓ IC50	0.00539	0.00421	0.0069		
06-0032-0824	Weight	NLR: 3P Cum Log-Normal (Probit)	✓ IC5	0.0000623	n/a	0.000252		1
			✓ IC10	0.000187	3.42E-05	0.000486		
			✓ IC25	0.00117	0.000711	0.00182		
			IC50	0.00895	0.00392	0.0204		

Height Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	61.8	59.2	64.3	59.6	63.5	0.805	1.61	2.61%	0.00%
0.0003		4	58.3	53.9	62.7	54.5	61	1.37	2.74	4.71%	5.59%
0.00065		4	55.3	50.5	60.1	52.8	59	1.51	3.02	5.46%	10.40%
0.0013		4	46.6	41.5	51.8	42.8	50.6	1.61	3.23	6.93%	24.49%
0.0027		4	36	30.4	41.6	32.7	40.6	1.76	3.52	9.77%	41.70%
0.0052		4	34.3	30.9	37.7	31.5	36.6	1.06	2.11	6.16%	44.45%

Weight Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	3220	2970	3470	3000	3350	78.2	156	4.85%	0.00%
0.0003		4	2820	2490	3150	2600	3100	103	206	7.31%	12.48%
0.00065		4	2740	1970	3510	2310	3290	242	484	17.67%	14.94%
0.0013		4	2260	2060	2460	2110	2410	62.7	125	5.55%	29.86%
0.0027		4	2040	1560	2520	1720	2440	151	301	14.81%	36.78%
0.0052		4	1940	1280	2590	1670	2540	205	411	21.21%	39.90%

CETIS Summary Report

Report Date: 06 Apr-20 19:04 (p 2 of 2)
Test Code/ID: 51017505 diveg / 13-0757-3698

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)**Syntech Research, Inc.****Height Detail**

Conc-lbs ae/A	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	61.9	62	63.5	59.6
0.0003		54.5	58.5	59.2	61
0.00065		56.6	59	52.9	52.8
0.0013		45.9	42.8	47.2	50.6
0.0027		36.8	33.9	40.6	32.7
0.0052		34.8	34.3	36.6	31.5

Weight Detail

Conc-lbs ae/A	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	3000	3240	3350	3290
0.0003		2600	3100	2760	2810
0.00065		3000	3290	2310	2360
0.0013		2110	2300	2210	2410
0.0027		1960	2020	2440	1720
0.0052		1860	1670	2540	1670

CETIS Analytical Report

Report Date: 06 Apr-20 18:48 (p 1 of 4)
 Test Code/ID: 51017505 direpr / 19-8782-5625

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Analysis ID:	16-2182-8057	Endpoint:	Height	CETIS Version:	CETISv1.9.5	
Analyzed:	06 Apr-20 18:42	Analysis:	Parametric-Control vs Treatments	Status Level:	1	
Batch ID:	00-5365-1199	Test Type:	Vegetative Vigor Tier II	Analyst:		
Start Date:	15 Aug-19	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:		
Ending Date:		Species:	Glycine max	Brine:		
Test Length:	n/a	Taxon:		Source:	Age: R1	
Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	0.00055	0.0011	0.0007778		5.21%

Dunnett Multiple Comparison Test

Control	vs	Conc-lbs ae/	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision($\alpha:5\%$)
Negative Control	0.00027	0.909	2.41	3.44	6	CDF	0.4623	Non-Significant Effect	
	0.00055	1.35	2.41	3.44	6	CDF	0.2806	Non-Significant Effect	
	0.0011*	4.36	2.41	3.44	6	CDF	8.6E-04	Significant Effect	
	0.0024*	7.96	2.41	3.44	6	CDF	2.7E-05	Significant Effect	
	0.0045*	12	2.41	3.44	6	CDF	2.7E-05	Significant Effect	

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Outlier	Grubbs Extreme Value Test	2.57	2.8	0.1339	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Between	909.237	181.847	5	44.5	<1.0E-37	Significant Effect
Error	73.5525	4.08625	18			
Total	982.79		23			

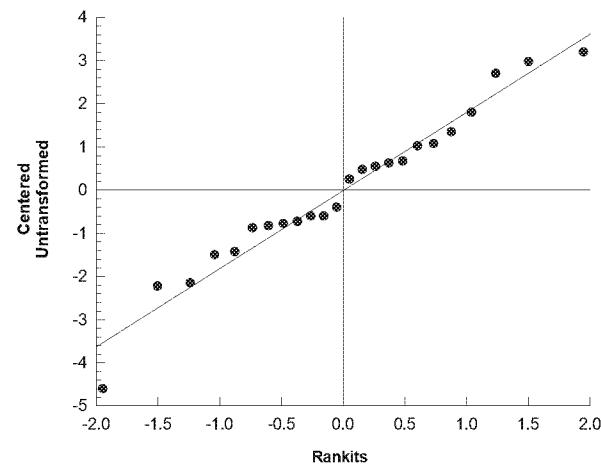
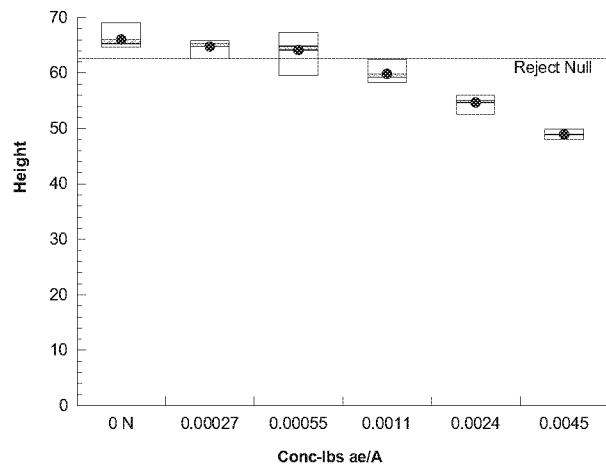
ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:1\%$)
Variance	Bartlett Equality of Variance Test	4.78	15.1	0.4427	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.968	0.884	0.6280	Normal Distribution

Height Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	66	62.8	69.2	65.2	64.6	69	1	3.04%	0.00%
0.00027		4	64.7	62.3	67.1	65.3	62.5	65.8	0.752	2.32%	1.97%
0.00055		4	64.1	58.7	69.5	64.8	59.5	67.3	1.7	5.31%	2.92%
0.0011		4	59.8	56.9	62.7	59.2	58.3	62.5	0.925	3.09%	9.43%
0.0024		4	54.7	52.3	57	55.1	52.5	56	0.753	2.76%	17.23%
0.0045		4	48.9	47.3	50.4	48.8	48	49.9	0.484	1.98%	25.98%

Graphics



CETIS Analytical Report

Report Date: 06 Apr-20 18:48 (p 2 of 4)
 Test Code/ID: 51017505 direpr / 19-8782-5625

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Analysis ID:	04-8748-3380	Endpoint:	Height	CETIS Version:	CETISv1.9.5	
Analyzed:	06 Apr-20 18:47	Analysis:	Parametric-Control vs Ord.Treatments	Status Level:	1	
Batch ID:	00-5365-1199	Test Type:	Vegetative Vigor Tier II	Analyst:		
Start Date:	15 Aug-19	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:		
Ending Date:		Species:	Glycine max	Brine:		
Test Length:	n/a	Taxon:		Source:	Age: R1	
Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	0.00055	0.0011	0.0007778		4.04%

Williams Multiple Comparison Test

Control	vs	Conc-lbs ae/	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision($\alpha:5\%$)
Negative Control		0.00027	0.909	1.73	2.48	6	CDF	>0.05	Non-Significant Effect
		0.00055	1.35	1.82	2.6	6	CDF	>0.05	Non-Significant Effect
		0.0011*	4.36	1.85	2.64	6	CDF	<0.05	Significant Effect
		0.0024*	7.96	1.86	2.66	6	CDF	<0.05	Significant Effect
		0.0045*	12	1.87	2.67	6	CDF	<0.05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Outlier	Grubbs Extreme Value Test	2.57	2.8	0.1339	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Between	909.237	181.847	5	44.5	<1.0E-37	Significant Effect
Error	73.5525	4.08625	18			
Total	982.79		23			

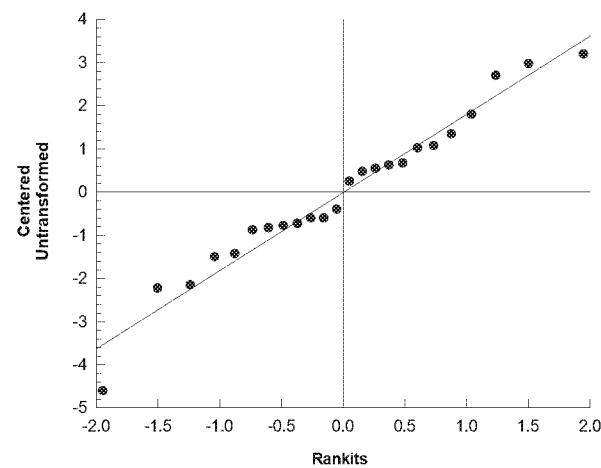
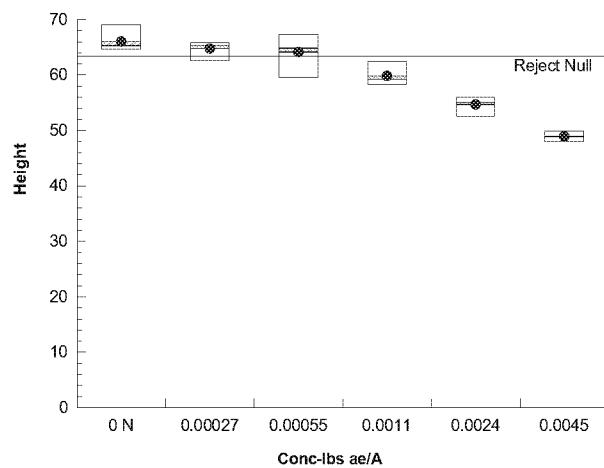
ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:1\%$)
Variance	Bartlett Equality of Variance Test	4.78	15.1	0.4427	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.968	0.884	0.6280	Normal Distribution

Height Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	66	62.8	69.2	65.2	64.6	69	1	3.04%	0.00%
0.00027		4	64.7	62.3	67.1	65.3	62.5	65.8	0.752	2.32%	1.97%
0.00055		4	64.1	58.7	69.5	64.8	59.5	67.3	1.7	5.31%	2.92%
0.0011		4	59.8	56.9	62.7	59.2	58.3	62.5	0.925	3.09%	9.43%
0.0024		4	54.7	52.3	57	55.1	52.5	56	0.753	2.76%	17.23%
0.0045		4	48.9	47.3	50.4	48.8	48	49.9	0.484	1.98%	25.98%

Graphics



CETIS Analytical Report

Report Date: 06 Apr-20 18:48 (p 3 of 4)
 Test Code/ID: 51017505 direpr / 19-8782-5625

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)					Syntech Research, Inc.			
Analysis ID:	05-1677-4265	Endpoint:	Weight	CETIS Version:	CETISv1.9.5			
Analyzed:	06 Apr-20 18:42	Analysis:	Parametric-Control vs Treatments	Status Level:	1			
Batch ID:	00-5365-1199	Test Type:	Vegetative Vigor Tier II	Analyst:				
Start Date:	15 Aug-19	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:				
Ending Date:		Species:	Glycine max	Brine:				
Test Length:	n/a	Taxon:		Source:	Age: R1			
Data Transform	Alt Hyp			NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T			0.00055	0.0011	0.0007778		18.46%

Dunnett Multiple Comparison Test

Control	vs	Conc-lbs ae/	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision($\alpha:5\%$)
Negative Control	0.00027	0.442	2.41	601	6	CDF	0.6723	Non-Significant Effect	
	0.00055	1.02	2.41	601	6	CDF	0.4127	Non-Significant Effect	
	0.0011*	2.45	2.41	601	6	CDF	0.0465	Significant Effect	
	0.0024*	3.93	2.41	601	6	CDF	0.0021	Significant Effect	
	0.0045*	4.94	2.41	601	6	CDF	2.7E-04	Significant Effect	

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Outlier	Grubbs Extreme Value Test	1.91	2.8	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Between	4951370	990274	5	7.94	4.2E-04	Significant Effect
Error	2245880	124771	18			
Total	7197250		23			

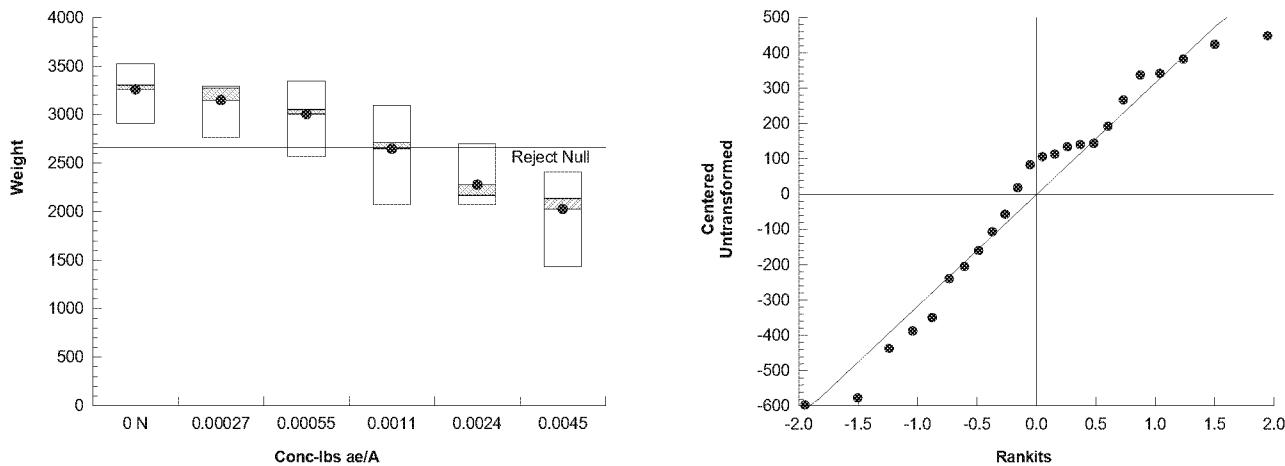
ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:1\%$)
Variance	Bartlett Equality of Variance Test	1.31	15.1	0.9341	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.947	0.884	0.2369	Normal Distribution

Weight Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	3260	2810	3710	3300	2910	3520	142	8.71%	0.00%
0.00027		4	3150	2730	3560	3270	2760	3290	130	8.23%	3.39%
0.00055		4	3000	2370	3640	3050	2560	3340	200	13.30%	7.83%
0.0011		4	2650	1970	3330	2710	2070	3090	213	16.13%	18.75%
0.0024		4	2270	1810	2730	2170	2070	2700	145	12.71%	30.17%
0.0045		4	2020	1360	2690	2130	1430	2410	210	20.71%	37.85%

Graphics



CETIS Analytical Report

Report Date: 06 Apr-20 18:48 (p 4 of 4)
 Test Code/ID: 51017505 direpr / 19-8782-5625

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)					Syntech Research, Inc.			
Analysis ID:	17-1725-1994	Endpoint:	Weight	CETIS Version:	CETISv1.9.5			
Analyzed:	06 Apr-20 18:47	Analysis:	Parametric-Control vs Ord.Treatments	Status Level:	1			
Batch ID:	00-5365-1199	Test Type:	Vegetative Vigor Tier II	Analyst:				
Start Date:	15 Aug-19	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:				
Ending Date:		Species:	Glycine max	Brine:				
Test Length:	n/a	Taxon:		Source:	Age: R1			
Data Transform	Alt Hyp			NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T			0.00055	0.0011	0.0007778		14.32%

Williams Multiple Comparison Test

Control	vs	Conc-lbs ae/	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision($\alpha:5\%$)
Negative Control	0.00027	0.442	1.73	433	6	CDF	>0.05	Non-Significant Effect	
	0.00055	1.02	1.82	454	6	CDF	>0.05		
	0.0011*	2.45	1.85	461	6	CDF	<0.05		Significant Effect
	0.0024*	3.93	1.86	464	6	CDF	<0.05		Significant Effect
	0.0045*	4.94	1.87	466	6	CDF	<0.05		Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Outlier	Grubbs Extreme Value Test	1.91	2.8	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Between	4951370	990274	5	7.94	4.2E-04	Significant Effect
Error	2245880	124771	18			
Total	7197250		23			

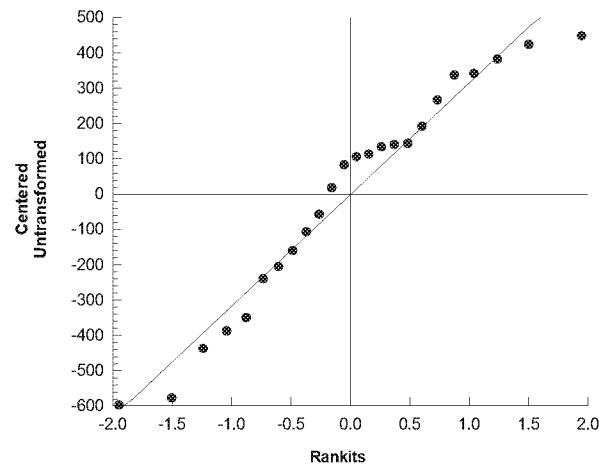
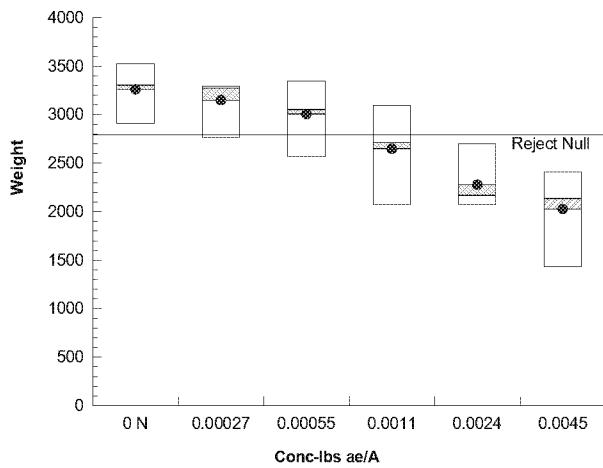
ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:1\%$)
Variance	Bartlett Equality of Variance Test	1.31	15.1	0.9341	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.947	0.884	0.2369	Normal Distribution

Weight Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	3260	2810	3710	3300	2910	3520	142	8.71%	0.00%
0.00027		4	3150	2730	3560	3270	2760	3290	130	8.23%	3.39%
0.00055		4	3000	2370	3640	3050	2560	3340	200	13.30%	7.83%
0.0011		4	2650	1970	3330	2710	2070	3090	213	16.13%	18.75%
0.0024		4	2270	1810	2730	2170	2070	2700	145	12.71%	30.17%
0.0045		4	2020	1360	2690	2130	1430	2410	210	20.71%	37.85%

Graphics



CETIS Analytical Report

Report Date: 06 Apr-20 18:49 (p 1 of 4)
 Test Code/ID: 51017505 direpr / 19-8782-5625

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Analysis ID:	12-6756-2876	Endpoint:	Height	CETIS Version:	CETISv1.9.5
Analyzed:	06 Apr-20 18:42	Analysis:	Nonlinear Regression (NLR)	Status Level:	1
Batch ID:	00-5365-1199	Test Type:	Vegetative Vigor Tier II	Analyst:	
Start Date:	15 Aug-19	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:	
Ending Date:		Species:	Glycine max	Brine:	
Test Length:	n/a	Taxon:		Source:	Age: R1

Non-Linear Regression Options

Model Name and Function		Weighting Function		PTBS Function	X Trans	Y Trans
3P Cum Log-Normal (Probit): $\mu = \alpha [1 - \Phi[\log[x/\delta]/\gamma]]$		Normal [$\omega=1$]		Off [$\mu^*=\mu$]	None	None

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	PMSE	Thresh	Optimize	F Stat	P-Value	Decision($\alpha:5\%$)
3	-14.7	36.5	38.9	0.9130	2.68%	66.2	Yes	0.368	0.7773	Non-Significant Lack of Fit

Point Estimates

Level	Ibs ae/A	95% LCL	95% UCL
IC5	0.000613	0.000412	0.000825
IC10	0.00125	0.000989	0.00153
IC25	0.00412	0.00351	0.00479
IC50	0.0155	0.0101	0.0239

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision($\alpha:5\%$)
α	66.2	0.853	64.4	68	77.6	<1.0E-37	Significant Parameter
γ	1.96	0.263	1.42	2.51	7.48	2.4E-07	Significant Parameter
δ	0.0155	0.003	0.00927	0.0217	5.17	4.0E-05	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Model	86400	28800	3	7750	<1.0E-37	Significant
Lack of Fit	4.51	1.5	3	0.368	0.7773	Non-Significant
Pure Error	73.6	4.09	18			
Residual	78.1	3.72	21			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Outlier	Grubbs Extreme Value Test	2.2	2.8	0.4956	No Outliers Detected
Variance	Bartlett Equality of Variance Test	4.78	11.1	0.4427	Equal Variances
	Mod Levene Equality of Variance	0.778	2.77	0.5784	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.203	2.49	0.9186	Normal Distribution
	Shapiro-Wilk W Normality Test	0.987	0.917	0.9810	Normal Distribution

Height Summary

Calculated Variate										
Conc-lbs ae/A	Code	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	
0	N	4	66	64.6	69	1	2.01	3.04%	0.0%	
0.00027		4	64.7	62.5	65.8	0.752	1.5	2.32%	1.97%	
0.00055		4	64.1	59.5	67.3	1.7	3.41	5.31%	2.92%	
0.0011		4	59.8	58.3	62.5	0.925	1.85	3.09%	9.43%	
0.0024		4	54.7	52.5	56	0.753	1.51	2.76%	17.2%	
0.0045		4	48.9	48	49.9	0.484	0.967	1.98%	26.0%	

CETIS Analytical Report

Report Date: 06 Apr-20 18:49 (p 2 of 4)
Test Code/ID: 51017505 direpr / 19-8782-5625

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

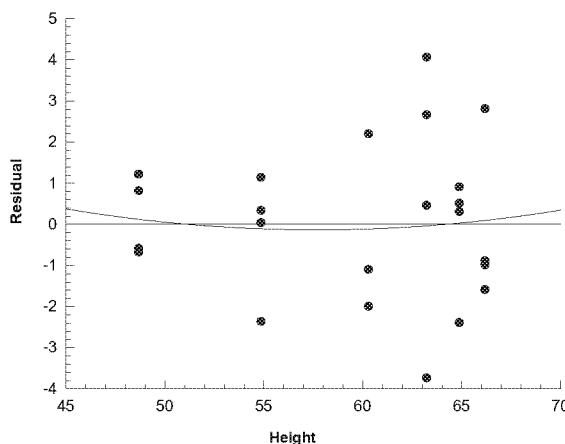
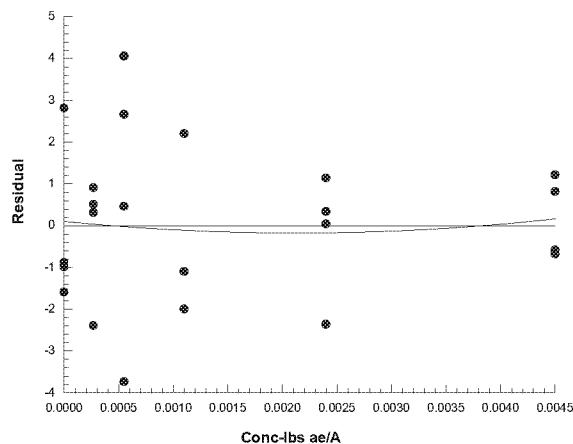
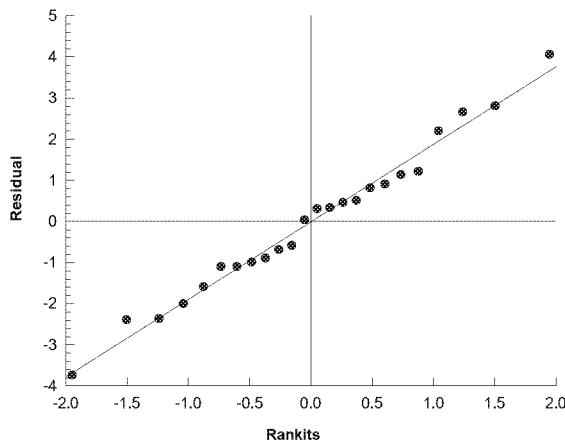
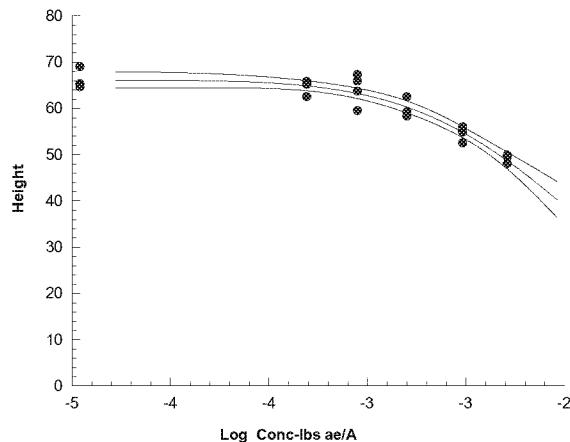
Analysis ID: 12-6756-2876
Analyzed: 06 Apr-20 18:42

Endpoint: Height
Analysis: Nonlinear Regression (NLR)

CETIS Version: CETISv1.9.5
Status Level: 1

Graphics

Model: 3P Cum Log-Normal (Probit): $\mu = \alpha \cdot [1 - \Phi[\log[x/\delta]/\gamma]]$ Distribution: Normal [$\omega=1$]



CETIS Analytical Report

Report Date: 06 Apr-20 18:49 (p 3 of 4)
 Test Code/ID: 51017505 direpr / 19-8782-5625

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)				Syntech Research, Inc.	
Analysis ID: 09-8237-4160	Endpoint: Weight			CETIS Version: CETISv1.9.5	
Analyzed: 06 Apr-20 18:42	Analysis: Nonlinear Regression (NLR)			Status Level: 1	
Batch ID: 00-5365-1199	Test Type: Vegetative Vigor Tier II			Analyst:	
Start Date: 15 Aug-19	Protocol: OCSPP 850.4150 Plant Vegetative Vigor			Diluent:	
Ending Date:	Species: Glycine max			Brine:	
Test Length: n/a	Taxon:			Source:	Age: R1

Non-Linear Regression Options

Model Name and Function	Weighting Function	PTBS Function	X Trans	Y Trans
3P Cum Log-Normal (Probit): $\mu = \alpha [1 - \Phi[\log(x/\delta)/\gamma]]$	Normal [$\omega=1$]	Off [$\mu^*=\mu$]	None	None

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	PMSD	Thresh	Optimize	F Stat	P-Value	Decision($\alpha:5\%$)
6	-138	284	286	0.6487	9.96%	3290	Yes	0.167	0.9175	Non-Significant Lack of Fit

Point Estimates

Level	Ibs ae/A	95% LCL	95% UCL
IC5	0.000245	n/a	0.000587
IC10	0.000523	0.000182	0.000977
IC25	0.00186	0.00124	0.00266
IC50	0.00762	0.00372	0.0156

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision($\alpha:5\%$)
α	3290	157	2960	3620	20.9	<1.0E-37	Significant Parameter
γ	2.09	0.593	0.857	3.32	3.52	0.0020	Significant Parameter
δ	0.00762	0.00248	0.00246	0.0128	3.07	0.0058	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Model	183000000	61000000	3	555	<1.0E-37	Significant
Lack of Fit	62400	20800	3	0.167	0.9175	Non-Significant
Pure Error	2250000	125000	18			
Residual	2310000	110000	21			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Outlier	Grubbs Extreme Value Test	2.01	2.8	0.8898	No Outliers Detected
Variance	Bartlett Equality of Variance Test	1.31	11.1	0.9341	Equal Variances
	Mod Levene Equality of Variance	0.367	2.77	0.8646	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.537	2.49	0.1722	Normal Distribution
	Shapiro-Wilk W Normality Test	0.941	0.917	0.1734	Normal Distribution

			Calculated Variate						
Conc-lbs ae/A	Code	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	3260	2910	3520	142	284	8.71%	0.0%
0.00027		4	3150	2760	3290	130	259	8.23%	3.39%
0.00055		4	3000	2560	3340	200	399	13.30%	7.83%
0.0011		4	2650	2070	3090	213	427	16.10%	18.8%
0.0024		4	2270	2070	2700	145	289	12.70%	30.2%
0.0045		4	2020	1430	2410	210	419	20.70%	37.8%

CETIS Analytical Report

Report Date: 06 Apr-20 18:49 (p 4 of 4)
 Test Code/ID: 51017505 direpr / 19-8782-5625

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

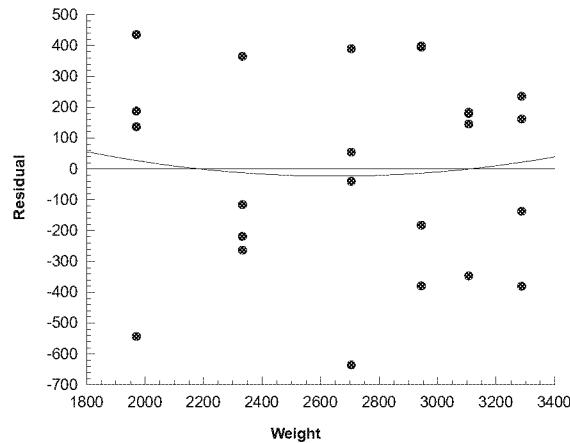
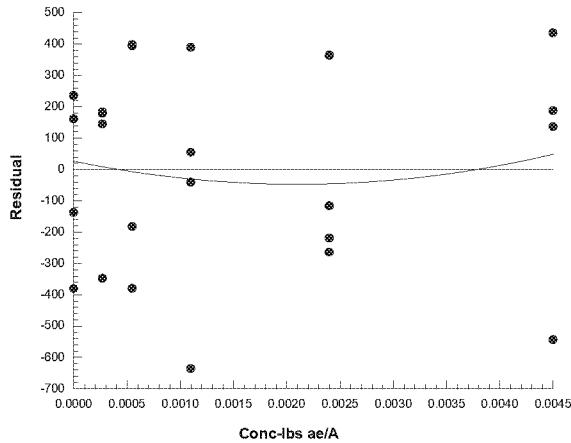
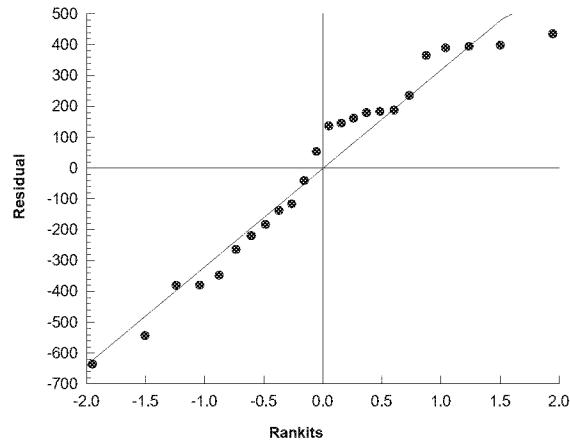
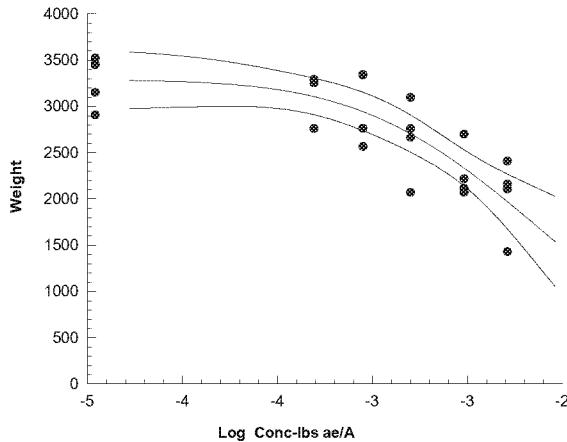
Analysis ID: 09-8237-4160
 Analyzed: 06 Apr-20 18:42

Endpoint: Weight
 Analysis: Nonlinear Regression (NLR)

CETIS Version: CETISv1.9.5
 Status Level: 1

Graphics

Model: 3P Cum Log-Normal (Probit): $\mu = \alpha \cdot [1 - \Phi[\log[x/\delta]/\gamma]]$ Distribution: Normal [$\omega=1$]



CETIS Analytical Report

Report Date: 06 Apr-20 19:03 (p 1 of 4)
 Test Code/ID: 51017505 diveg / 13-0757-3698

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Analysis ID:	18-6521-9080	Endpoint:	Height	CETIS Version:	CETISv1.9.5	
Analyzed:	06 Apr-20 18:53	Analysis:	Parametric-Control vs Treatments	Status Level:	1	
Batch ID:	20-1949-4057	Test Type:	Vegetative Vigor Tier II	Analyst:		
Start Date:	05 Aug-19	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:		
Ending Date:		Species:	Glycine max	Brine:		
Test Length:	n/a	Taxon:		Source:	Age: V3	
Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	0.0003	0.00065	0.0004416		7.67%

Dunnett Multiple Comparison Test

Control	vs	Conc-lbs ae/	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α :5%)
Negative Control		0.0003	1.75	2.41	4.74	6	CDF	0.1564	Non-Significant Effect
		0.00065*	3.26	2.41	4.74	6	CDF	0.0089	Significant Effect
		0.0013*	7.68	2.41	4.74	6	CDF	2.8E-05	Significant Effect
		0.0027*	13.1	2.41	4.74	6	CDF	2.7E-05	Significant Effect
		0.0052*	13.9	2.41	4.74	6	CDF	2.7E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α :5%)
Outlier	Grubbs Extreme Value Test	1.87	2.8	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α :5%)
Between	2717.23	543.446	5	70.1	<1.0E-37	Significant Effect
Error	139.505	7.75028	18			
Total	2856.73		23			

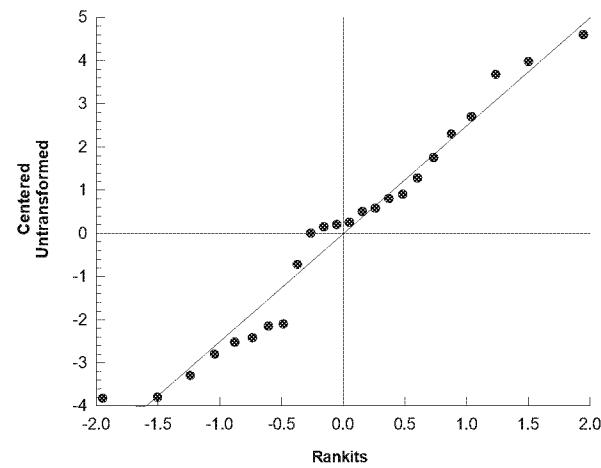
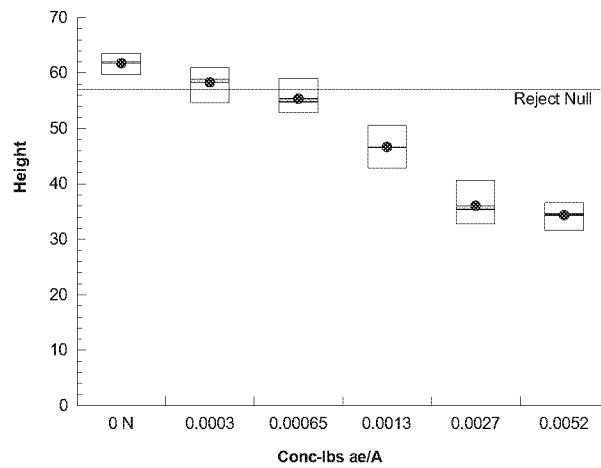
ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α :1%)
Variance	Bartlett Equality of Variance Test	1.99	15.1	0.8503	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.956	0.884	0.3641	Normal Distribution

Height Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	61.8	59.2	64.3	62	59.6	63.5	0.805	2.61%	0.00%
0.0003		4	58.3	53.9	62.7	58.8	54.5	61	1.37	4.71%	5.59%
0.00065		4	55.3	50.5	60.1	54.8	52.8	59	1.51	5.46%	10.40%
0.0013		4	46.6	41.5	51.8	46.6	42.8	50.6	1.61	6.93%	24.49%
0.0027		4	36	30.4	41.6	35.3	32.7	40.6	1.76	9.77%	41.70%
0.0052		4	34.3	30.9	37.7	34.5	31.5	36.6	1.06	6.16%	44.45%

Graphics



CETIS Analytical Report

Report Date: 06 Apr-20 19:03 (p 2 of 4)
 Test Code/ID: 51017505 diveg / 13-0757-3698

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Analysis ID:	09-9816-8832	Endpoint:	Height	CETIS Version:	CETISv1.9.5	
Analyzed:	06 Apr-20 18:55	Analysis:	Parametric-Control vs Ord.Treatments	Status Level:	1	
Batch ID:	20-1949-4057	Test Type:	Vegetative Vigor Tier II	Analyst:		
Start Date:	05 Aug-19	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:		
Ending Date:		Species:	Glycine max	Brine:		
Test Length:	n/a	Taxon:		Source:	Age: V3	
Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	<0.0003	0.0003	n/a		5.95%

Williams Multiple Comparison Test

Control	vs	Control II	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α :5%)
Negative Control		0.0003*	1.75	1.73	3.41	6	CDF	<0.05	Significant Effect
		0.00065*	3.26	1.82	3.58	6	CDF	<0.05	Significant Effect
		0.0013*	7.68	1.85	3.63	6	CDF	<0.05	Significant Effect
		0.0027*	13.1	1.86	3.66	6	CDF	<0.05	Significant Effect
		0.0052*	13.9	1.87	3.68	6	CDF	<0.05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α :5%)
Outlier	Grubbs Extreme Value Test	1.87	2.8	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α :5%)
Between	2717.23	543.446	5	70.1	<1.0E-37	Significant Effect
Error	139.505	7.75028	18			
Total	2856.73		23			

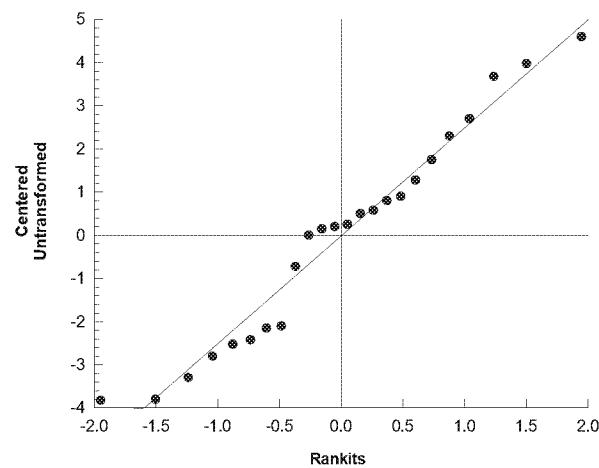
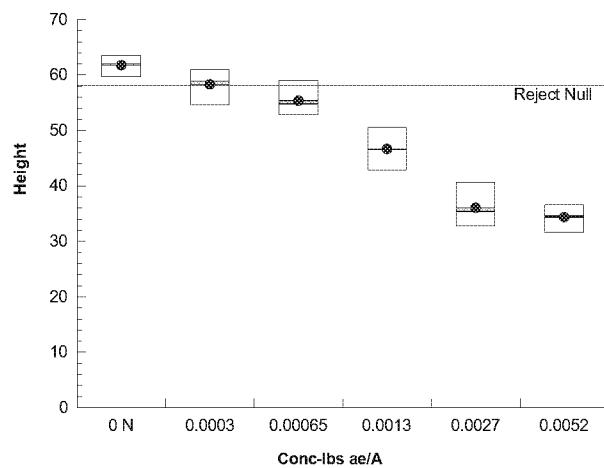
ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α :1%)
Variance	Bartlett Equality of Variance Test	1.99	15.1	0.8503	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.956	0.884	0.3641	Normal Distribution

Height Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	61.8	59.2	64.3	62	59.6	63.5	0.805	2.61%	0.00%
0.0003		4	58.3	53.9	62.7	58.8	54.5	61	1.37	4.71%	5.59%
0.00065		4	55.3	50.5	60.1	54.8	52.8	59	1.51	5.46%	10.40%
0.0013		4	46.6	41.5	51.8	46.6	42.8	50.6	1.61	6.93%	24.49%
0.0027		4	36	30.4	41.6	35.3	32.7	40.6	1.76	9.77%	41.70%
0.0052		4	34.3	30.9	37.7	34.5	31.5	36.6	1.06	6.16%	44.45%

Graphics



CETIS Analytical Report

Report Date: 06 Apr-20 19:03 (p 3 of 4)
 Test Code/ID: 51017505 diveg / 13-0757-3698

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)				Syntech Research, Inc.		
Analysis ID:	01-3472-1028	Endpoint:	Weight	CETIS Version:	CETISv1.9.5	
Analyzed:	06 Apr-20 18:53	Analysis:	Parametric-Control vs Treatments	Status Level:	1	
Batch ID:	20-1949-4057	Test Type:	Vegetative Vigor Tier II	Analyst:		
Start Date:	05 Aug-19	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:		
Ending Date:		Species:	Glycine max	Brine:		
Test Length:	n/a	Taxon:		Source:	Age: V3	
Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	0.00065	0.0013	0.0009192		16.38%

Dunnett Multiple Comparison Test

Control	vs	Conc-lbs ae/	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision($\alpha:5\%$)
Negative Control	0.0003		1.83	2.41	527	6	CDF	0.1375	Non-Significant Effect
	0.00065		2.2	2.41	527	6	CDF	0.0740	Non-Significant Effect
	0.0013*		4.39	2.41	527	6	CDF	8.1E-04	Significant Effect
	0.0027*		5.41	2.41	527	6	CDF	1.1E-04	Significant Effect
	0.0052*		5.86	2.41	527	6	CDF	6.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Outlier	Grubbs Extreme Value Test	2.19	2.8	0.5171	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Between	5079290	1015860	5	10.6	7.3E-05	Significant Effect
Error	1728540	96029.8	18			
Total	6807830		23			

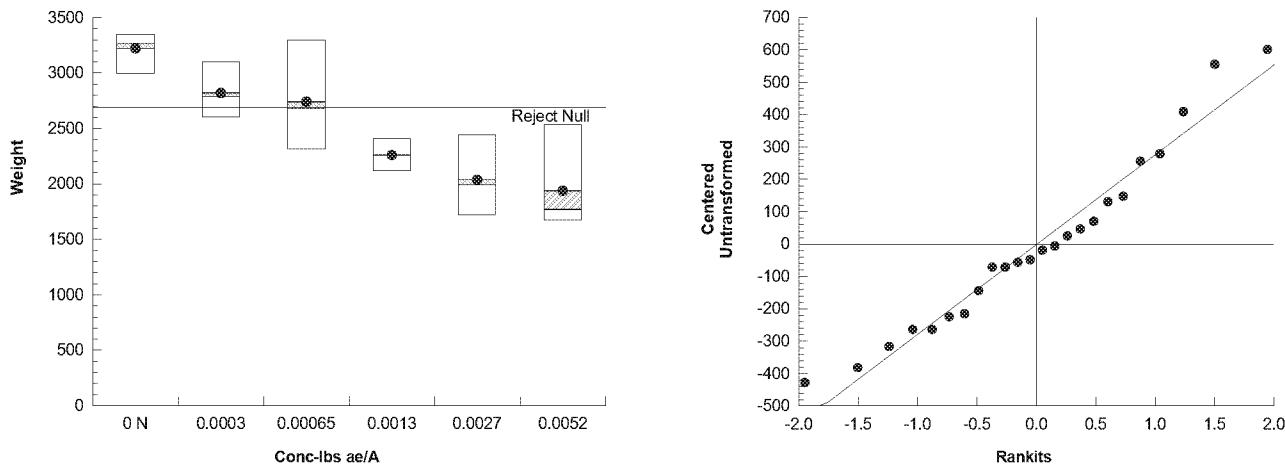
ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:1\%$)
Variance	Bartlett Equality of Variance Test	6.9	15.1	0.2284	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.956	0.884	0.3717	Normal Distribution

Weight Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	3220	2970	3470	3270	3000	3350	78.2	4.85%	0.00%
0.0003		4	2820	2490	3150	2790	2600	3100	103	7.31%	12.48%
0.00065		4	2740	1970	3510	2680	2310	3290	242	17.67%	14.94%
0.0013		4	2260	2060	2460	2260	2110	2410	62.7	5.55%	29.86%
0.0027		4	2040	1560	2520	1990	1720	2440	151	14.81%	36.78%
0.0052		4	1940	1280	2590	1770	1670	2540	205	21.21%	39.90%

Graphics



OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)					Syntech Research, Inc.			
Analysis ID:	08-5942-0619	Endpoint:	Weight	CETIS Version:	CETISv1.9.5			
Analyzed:	06 Apr-20 18:55	Analysis:	Parametric-Control vs Ord.Treatments	Status Level:	1			
Batch ID:	20-1949-4057	Test Type:	Vegetative Vigor Tier II	Analyst:				
Start Date:	05 Aug-19	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:				
Ending Date:		Species:	Glycine max	Brine:				
Test Length:	n/a	Taxon:		Source:	Age: V3			
Data Transform	Alt Hyp			NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T			<0.0003	0.0003	n/a		12.70%

Williams Multiple Comparison Test

Control	vs	Control II	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision($\alpha:5\%$)
Negative Control	0.0003*		1.83	1.73	380	6	CDF	<0.05	Significant Effect
	0.00065*		2.2	1.82	398	6	CDF	<0.05	Significant Effect
	0.0013*		4.39	1.85	404	6	CDF	<0.05	Significant Effect
	0.0027*		5.41	1.86	407	6	CDF	<0.05	Significant Effect
	0.0052*		5.86	1.87	409	6	CDF	<0.05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Outlier	Grubbs Extreme Value Test	2.19	2.8	0.5171	No Outliers Detected

ANOVA Table

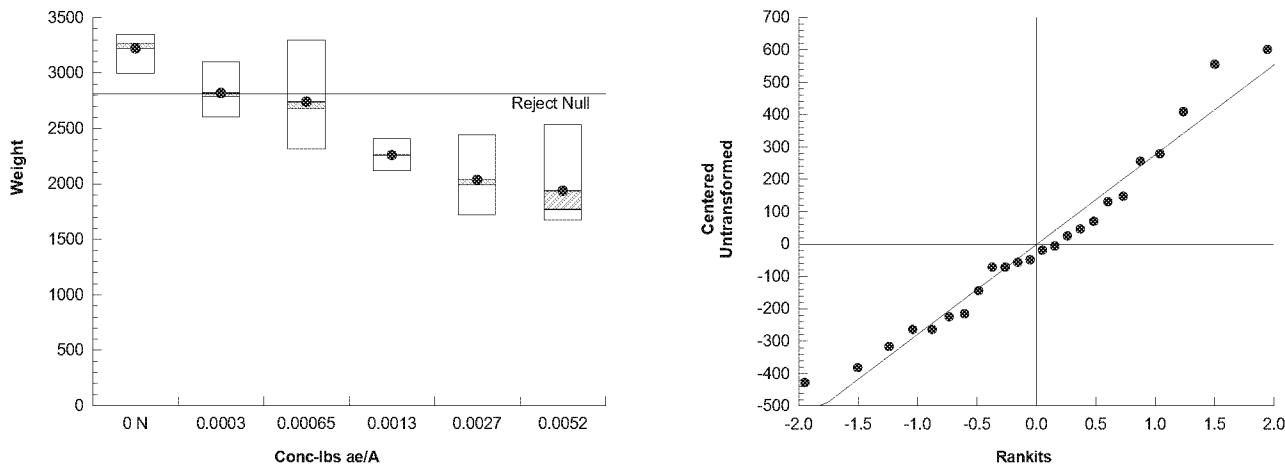
Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Between	5079290	1015860	5	10.6	7.3E-05	Significant Effect
Error	1728540	96029.8	18			
Total	6807830		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:1\%$)
Variance	Bartlett Equality of Variance Test	6.9	15.1	0.2284	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.956	0.884	0.3717	Normal Distribution

Weight Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	3220	2970	3470	3270	3000	3350	78.2	4.85%	0.00%
0.0003		4	2820	2490	3150	2790	2600	3100	103	7.31%	12.48%
0.00065		4	2740	1970	3510	2680	2310	3290	242	17.67%	14.94%
0.0013		4	2260	2060	2460	2260	2110	2410	62.7	5.55%	29.86%
0.0027		4	2040	1560	2520	1990	1720	2440	151	14.81%	36.78%
0.0052		4	1940	1280	2590	1770	1670	2540	205	21.21%	39.90%

Graphics

CETIS Analytical Report

Report Date: 06 Apr-20 19:04 (p 1 of 4)
 Test Code/ID: 51017505 diveg / 13-0757-3698

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)				Syntech Research, Inc.	
Analysis ID:	08-0873-3807	Endpoint:	Height	CETIS Version:	CETISv1.9.5
Analyzed:	06 Apr-20 18:53	Analysis:	Nonlinear Regression (NLR)	Status Level:	1
Batch ID:	20-1949-4057	Test Type:	Vegetative Vigor Tier II	Analyst:	
Start Date:	05 Aug-19	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:	
Ending Date:		Species:	Glycine max	Brine:	
Test Length:	n/a	Taxon:		Source:	Age: V3

Non-Linear Regression Options

Model Name and Function	Weighting Function	PTBS Function	X Trans	Y Trans
3P Cum Log-Normal (Probit): $\mu = \alpha [1 - \Phi[\log(x/\delta)/\gamma]]$		Normal [$\omega=1$]	Off [$\mu^*=\mu$]	None None

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	PMSE	Thresh	Optimize	F Stat	P-Value	Decision($\alpha:5\%$)
7	-28.2	63.7	66	0.9072	5.42%	62.5	Yes	4.41	0.0171	Significant Lack of Fit

Point Estimates

Level	Ibs ae/A	95% LCL	95% UCL
IC5	0.000194	7.02E-05	0.000332
IC10	0.000404	0.000255	0.000575
IC25	0.00138	0.00112	0.00167
IC50	0.00539	0.00421	0.0069

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision($\alpha:5\%$)
α	62.5	1.63	59.1	65.9	38.4	<1.0E-37	Significant Parameter
γ	2.02	0.246	1.51	2.53	8.21	<1.0E-37	Significant Parameter
δ	0.00539	0.000688	0.00396	0.00682	7.83	<1.0E-37	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Model	59600	19900	3	1720	<1.0E-37	Significant
Lack of Fit	103	34.2	3	4.41	0.0171	Significant
Pure Error	140	7.75	18			
Residual	242	11.5	21			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Outlier	Grubbs Extreme Value Test	2.13	2.8	0.6286	No Outliers Detected
Variance	Bartlett Equality of Variance Test	1.99	11.1	0.8503	Equal Variances
	Mod Levene Equality of Variance	0.695	2.77	0.6341	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.301	2.49	0.6079	Normal Distribution
	Shapiro-Wilk W Normality Test	0.974	0.917	0.7576	Normal Distribution

			Calculated Variate						
Conc-lbs ae/A	Code	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	61.8	59.6	63.5	0.805	1.61	2.61%	0.0%
0.0003		4	58.3	54.5	61	1.37	2.74	4.71%	5.59%
0.00065		4	55.3	52.8	59	1.51	3.02	5.46%	10.4%
0.0013		4	46.6	42.8	50.6	1.61	3.23	6.93%	24.5%
0.0027		4	36	32.7	40.6	1.76	3.52	9.77%	41.7%
0.0052		4	34.3	31.5	36.6	1.06	2.11	6.16%	44.5%

CETIS Analytical Report

Report Date: 06 Apr-20 19:04 (p 2 of 4)
 Test Code/ID: 51017505 diveg / 13-0757-3698

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

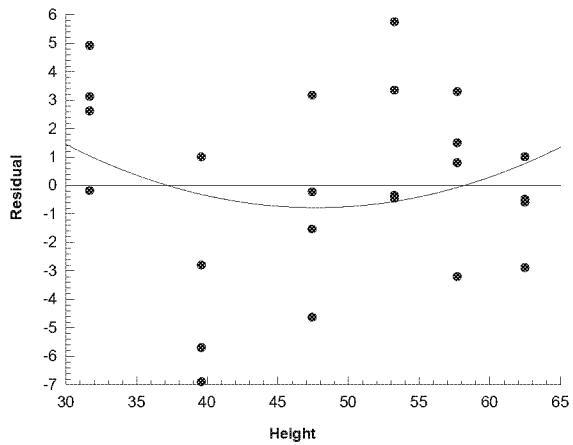
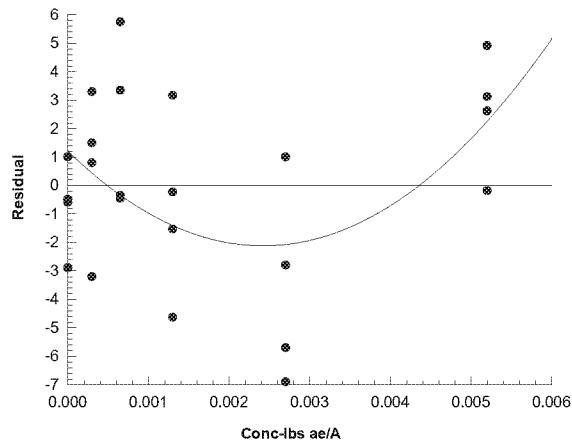
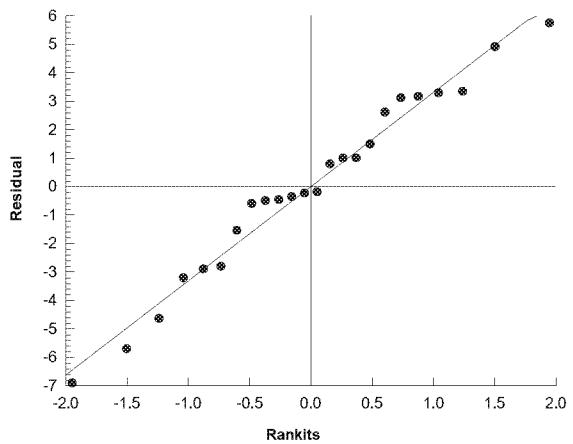
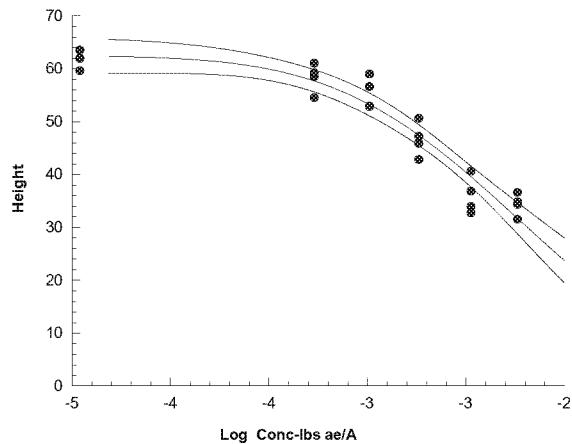
Analysis ID: 08-0873-3807
 Analyzed: 06 Apr-20 18:53

Endpoint: Height
 Analysis: Nonlinear Regression (NLR)

CETIS Version: CETISv1.9.5
 Status Level: 1

Graphics

Model: 3P Cum Log-Normal (Probit): $\mu = \alpha \cdot [1 - \Phi[\log[x/\delta]/\gamma]]$ Distribution: Normal [$\omega=1$]



CETIS Analytical Report

Report Date: 06 Apr-20 19:04 (p 3 of 4)
 Test Code/ID: 51017505 diveg / 13-0757-3698

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)						Syntech Research, Inc.		
Analysis ID:	06-0032-0824	Endpoint:	Weight			CETIS Version:	CETISv1.9.5	
Analyzed:	06 Apr-20 18:53	Analysis:	Nonlinear Regression (NLR)			Status Level:	1	
Batch ID:	20-1949-4057	Test Type:	Vegetative Vigor Tier II			Analyst:		
Start Date:	05 Aug-19	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor			Diluent:		
Ending Date:		Species:	Glycine max			Brine:		
Test Length:	n/a	Taxon:				Source:		
						Age:	V3	

Non-Linear Regression Options

Model Name and Function	Weighting Function	PTBS Function	X Trans	Y Trans
3P Cum Log-Normal (Probit): $\mu = \alpha [1 - \Phi[\log(x/\delta)/\gamma]]$	Normal [$\omega=1$]	Off [$\mu^*=\mu$]	None	None

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	PMSE	Thresh	Optimize	F Stat	P-Value	Decision($\alpha:5\%$)
4	-136	279	281	0.6913	9.64%	3230	Yes	0.661	0.5869	Non-Significant Lack of Fit

Point Estimates

Level	Ibs ae/A	95% LCL	95% UCL
IC5	0.0000623	n/a	0.000252
IC10	0.000187	3.42E-05	0.000486
IC25	0.00117	0.000711	0.00182
IC50	0.00895	0.00392	0.0204

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision($\alpha:5\%$)
α	3230	150	2920	3540	21.6	<1.0E-37	Significant Parameter
γ	3.02	0.741	1.48	4.56	4.07	5.4E-04	Significant Parameter
δ	0.00895	0.00364	0.00138	0.0165	2.46	0.0226	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Model	155000000	51700000	3	566	<1.0E-37	Significant
Lack of Fit	190000	63400	3	0.661	0.5869	Non-Significant
Pure Error	1730000	96000	18			
Residual	1920000	91400	21			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Outlier	Grubbs Extreme Value Test	2.38	2.8	0.2708	No Outliers Detected
Variance	Mod Levene Equality of Variance	1.6	2.77	0.2107	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	1.07	2.49	0.0086	Non-Normal Distribution
	Shapiro-Wilk W Normality Test	0.888	0.917	0.0122	Non-Normal Distribution

Weight Summary

Conc-lbs ae/A	Code	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	3220	3000	3350	78.2	156	4.85%	0.0%
0.0003		4	2820	2600	3100	103	206	7.31%	12.5%
0.00065		4	2740	2310	3290	242	484	17.70%	14.9%
0.0013		4	2260	2110	2410	62.7	125	5.55%	29.9%
0.0027		4	2040	1720	2440	151	301	14.80%	36.8%
0.0052		4	1940	1670	2540	205	411	21.20%	39.9%

CETIS Analytical Report

Report Date: 06 Apr-20 19:04 (p 4 of 4)
 Test Code/ID: 51017505 diveg / 13-0757-3698

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

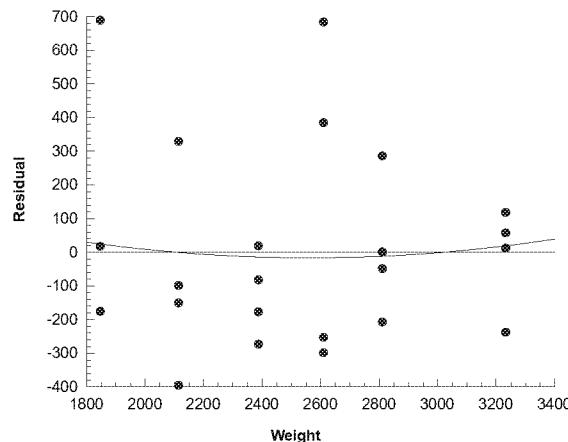
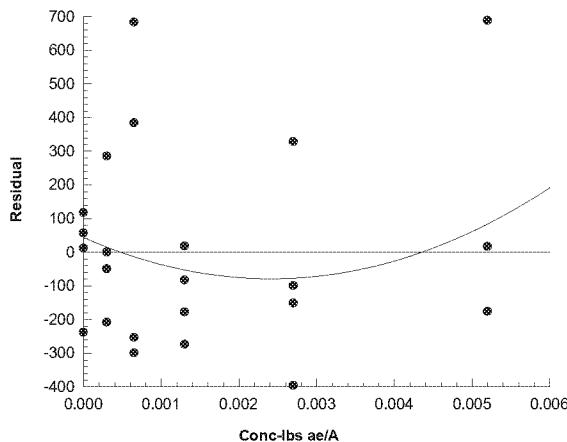
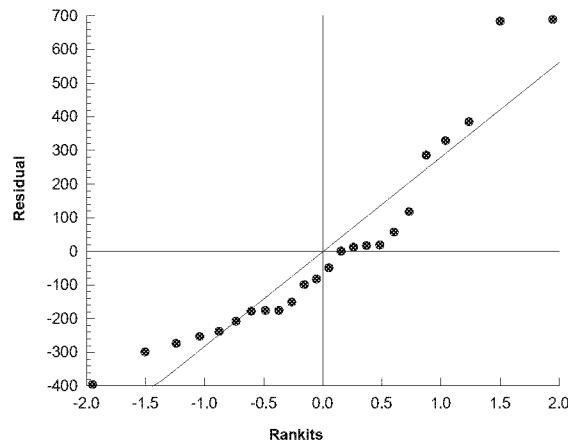
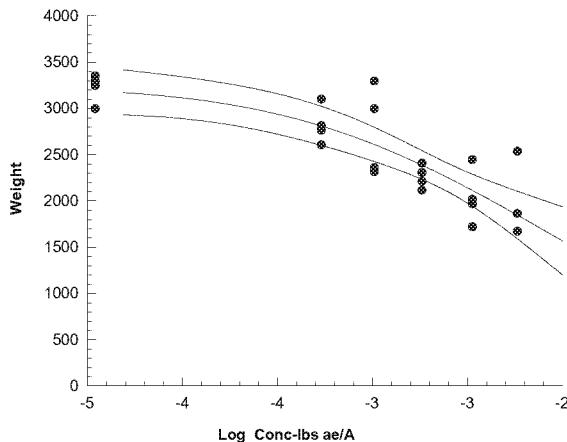
Analysis ID: 06-0032-0824
 Analyzed: 06 Apr-20 18:53

Endpoint: Weight
 Analysis: Nonlinear Regression (NLR)

CETIS Version: CETISv1.9.5
 Status Level: 1

Graphics

Model: 3P Cum Log-Normal (Probit): $\mu = \alpha \cdot [1 - \Phi[\log[x/\delta]/\gamma]]$ Distribution: Normal [$\omega=1$]



CETIS Analytical Report

Report Date: 22 May-20 14:47 (p 1 of 2)
 Test Code/ID: 51017505 dv14 / 13-0749-7295

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Analysis ID:	06-3770-9105	Endpoint:	Height	CETIS Version:	CETISv1.9.6
Analyzed:	22 May-20 14:44	Analysis:	Nonlinear Regression (NLR)	Status Level:	1
Batch ID:	18-7837-7561	Test Type:	Vegetative Vigor Tier II	Analyst:	
Start Date:	05 Aug-19	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:	
Ending Date:	22 May-20 14:40	Species:	Glycine max	Brine:	
Test Length:	291d 15h	Taxon:		Source:	Age:
Sample ID:	17-0601-6900	Code:	65AFC084	Project:	
Sample Date:	05 Aug-19	Material:	Dicamba DGA	Source:	Monsanto Company
Receipt Date:	22 May-20 14:40	CAS (PC):		Station:	
Sample Age:	n/a	Client:	CDM Smith - K. Bozicevich		

Non-Linear Regression Options

Model Name and Function			Weighting Function			PTBS Function		X Trans	Y Trans
3P Cum Log-Normal (Probit): $\mu = \alpha \cdot [1 - \Phi[\log[x/\delta]/\gamma]]$			Normal [$\omega=1$]			Off [$\mu^*=\mu$]		None	None

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	PMSD	Thresh	Optimize	F Stat	P-Value	Decision($\alpha:5\%$)
12	-10.63	28.47	30.8	0.9220	4.56%	33.29	Yes	4.182	0.0207	Sig Lack of Fit

Point Estimates

Level	Ibs ae/A	95% LCL	95% UCL
IC5	0.0003754	0.0002019	0.000548
IC10	0.0006868	0.0004913	0.0008957
IC15	0.001032	0.000803	0.001283
IC20	0.001427	0.001169	0.001711
IC25	0.001885	0.001599	0.002198
IC40	0.003796	0.003259	0.004406
IC50	0.005785	0.004714	0.007098

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision($\alpha:5\%$)
α	33.29	0.7298	31.77	34.81	45.61	<1.0E-37	Significant Parameter
γ	1.663	0.1978	1.251	2.074	8.407	<1.0E-37	Significant Parameter
δ	0.005785	0.0005747	0.004589	0.00698	10.06	<1.0E-37	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Model	18380	6125	3	2306	<1.0E-37	Significant Effect
Lack of Fit	22.91	7.638	3	4.182	0.0207	Significant Effect
Pure Error	32.88	1.826	18			
Residual	55.79	2.657	21			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Variance	Bartlett Equality of Variance Test	4.76	11.07	0.4458	Equal Variances
	Mod Levene Equality of Variance	1.831	2.773	0.1574	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.4762	2.492	0.2427	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9543	0.9169	0.3350	Normal Distribution

Height Summary

Conc-lbs ae/A	Code	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	
0	N	4	32.8	32.1	33.7	0.3536	0.7071	2.16%	0.0%
0.0003		4	32.07	31	33.2	0.4498	0.8995	2.80%	2.21%
0.00065		4	31.45	29.5	34.3	1.144	2.288	7.28%	4.12%
0.0013		4	26.93	25.6	28.3	0.5573	1.115	4.14%	17.91%
0.0027		4	20.9	19.8	22.4	0.5431	1.086	5.20%	36.28%
0.0052		4	18.55	16.9	20.3	0.7053	1.411	7.61%	43.45%

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

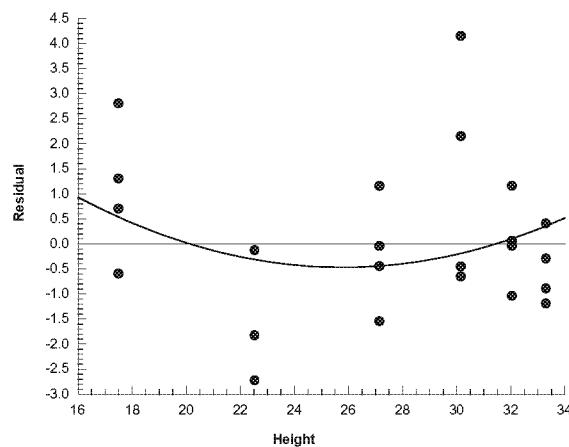
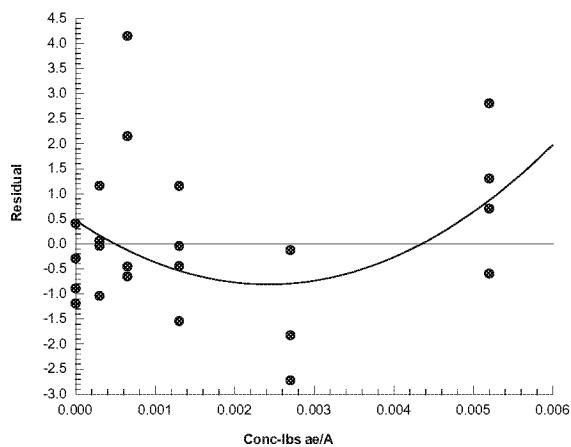
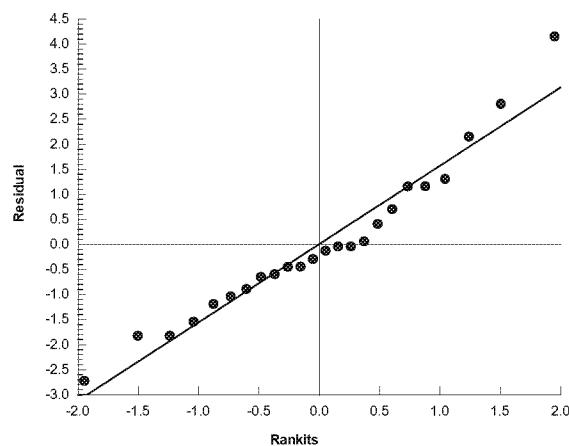
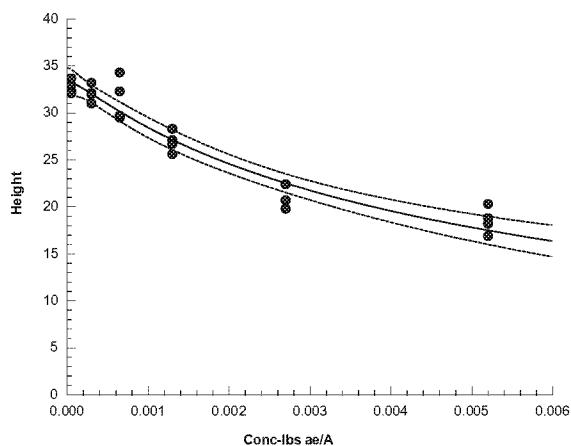
Syntech Research, Inc.

Analysis ID: 06-3770-9105 Endpoint: Height
Analyzed: 22 May-20 14:44 Analysis: Nonlinear Regression (NLR)CETIS Version: CETISv1.9.6
Status Level: 1

Height Detail

Conc-lbs ae/A	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	32.4	33	33.7	32.1
0.0003		31	32.1	32	33.2
0.00065		32.3	34.3	29.5	29.7
0.0013		27.1	25.6	26.7	28.3
0.0027		22.4	20.7	20.7	19.8
0.0052		20.3	18.8	18.2	16.9

Graphics

Model: 3P Cum Log-Normal (Probit): $\mu = \alpha [1 - \Phi[\log[x/\delta]/\gamma]]$ Distribution: Normal [$\omega=1$]

CETIS Analytical Report

Report Date: 22 May-20 14:39 (p 1 of 2)
 Test Code/ID: 51017505 dre14 / 19-8782-5625

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Analysis ID:	04-3178-0398	Endpoint:	Height	CETIS Version:	CETISv1.9.6
Analyzed:	22 May-20 14:35	Analysis:	Nonlinear Regression (NLR)	Status Level:	1
Batch ID:	00-5365-1199	Test Type:	Vegetative Vigor Tier II	Analyst:	
Start Date:	15 Aug-19	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:	
Ending Date:		Species:	Glycine max	Brine:	
Test Length:	n/a	Taxon:		Source:	Age: R1
Sample ID:	14-5402-4357	Code:	51017505 direpr	Project:	
Sample Date:	15 Aug-19	Material:	Dicamba DGA	Source:	Monsanto Company
Receipt Date:		CAS (PC):		Station:	
Sample Age:	n/a	Client:	CDM Smith - K. Bozicevich		

128931 51017505; Soybean yield; Reproductive (R1)

Non-Linear Regression Options

Model Name and Function	Weighting Function	PTBS Function	X Trans	Y Trans
3P Cum Log-Normal (Probit): $\mu = \alpha \cdot [1 - \Phi[\log[x/\delta]/\gamma]]$	Normal [$\omega=1$]	Off [$\mu^*=\mu$]	None	None

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	PMSE	Thresh	Optimize	F Stat	P-Value	Decision($\alpha:5\%$)
14	-18.88	44.97	47.3	0.7183	3.01%	54.51	Yes	0.382	0.7672	Non-Sig Lack of Fit

Point Estimates

Level	Ibs ae/A	95% LCL	95% UCL
IC5	0.001558	0.0007886	0.002254
IC10	0.0026	0.001927	0.003288
IC15	0.003674	0.002977	0.004407
IC20	0.004835	0.003696	0.006093
IC25	0.006119	0.004185	0.008433
IC40	0.01108	0.005358	0.02097
IC50	0.01584	0.006339	0.03956

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision($\alpha:5\%$)
α	54.51	0.7892	52.87	56.16	69.07	<1.0E-37	Significant Parameter
γ	1.41	0.4128	0.5513	2.268	3.415	0.0026	Significant Parameter
δ	0.01584	0.006324	0.002685	0.02899	2.504	0.0206	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Model	64330	21440	3	4058	<1.0E-37	Significant Effect
Lack of Fit	6.642	2.214	3	0.382	0.7672	Non-Significant Effect
Pure Error	104.3	5.795	18			
Residual	111	5.283	21			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Variance	Bartlett Equality of Variance Test	5.825	11.07	0.3236	Equal Variances
	Mod Levene Equality of Variance	1.102	2.773	0.3936	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.2024	2.492	0.9212	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9871	0.9169	0.9842	Normal Distribution

CETIS Analytical Report

Report Date: 22 May-20 14:39 (p 2 of 2)
 Test Code/ID: 51017505 dre14 / 19-8782-5625

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Analysis ID: 04-3178-0398

Endpoint: Height

CETIS Version: CETISv1.9.6

Analyzed: 22 May-20 14:35

Analysis: Nonlinear Regression (NLR)

Status Level: 1

Height Summary

Calculated Variate

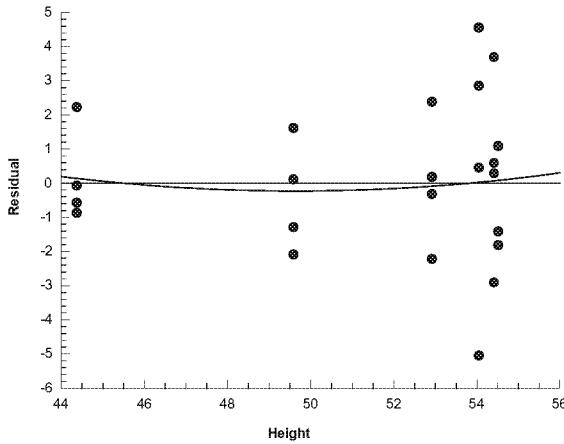
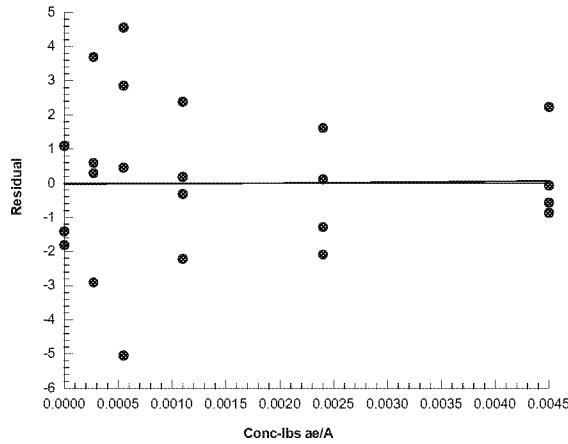
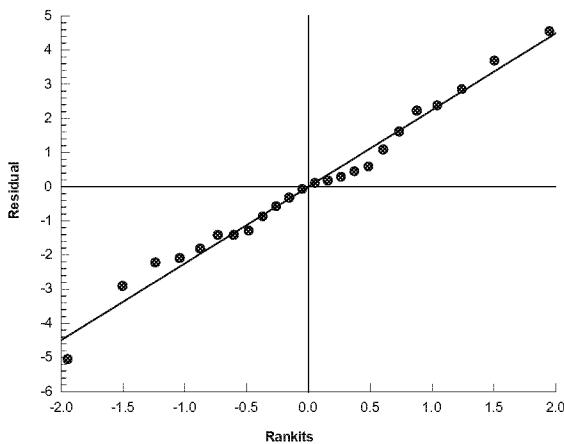
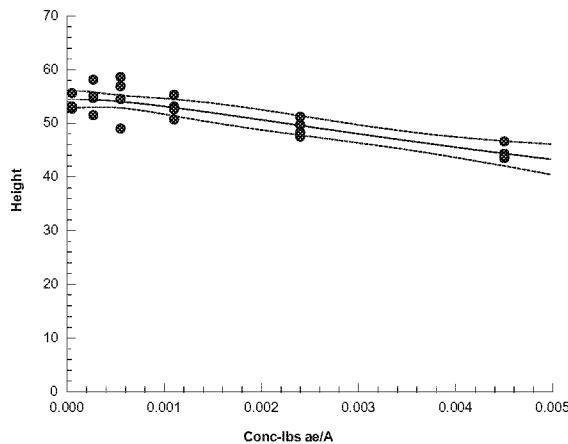
Conc-lbs ae/A	Code	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	53.62	52.7	55.6	0.6651	1.33	2.48%	0.0%
0.00027		4	54.82	51.5	58.1	1.349	2.697	4.92%	-2.24%
0.00055		4	54.75	49	58.6	2.093	4.186	7.65%	-2.1%
0.0011		4	52.92	50.7	55.3	0.9455	1.891	3.57%	1.31%
0.0024		4	49.18	47.5	51.2	0.8138	1.628	3.31%	8.3%
0.0045		4	44.55	43.5	46.6	0.703	1.406	3.16%	16.92%

Height Detail

Conc-lbs ae/A	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	53.1	52.7	53.1	55.6
0.00027		51.5	54.7	58.1	55
0.00055		49	54.5	56.9	58.6
0.0011		53.1	55.3	52.6	50.7
0.0024		51.2	47.5	49.7	48.3
0.0045		43.5	46.6	44.3	43.8

Graphics

Model: 3P Cum Log-Normal (Probit): $\mu = \alpha [1 - \Phi[\log[x/\delta]/\gamma]]$ Distribution: Normal [$\omega=1$]



CETIS Analytical Report

Report Date: 22 May-20 14:39 (p 1 of 2)
 Test Code/ID: 51017505 dre14 / 19-8782-5625

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)				Syntech Research, Inc.
Analysis ID: 09-3750-1412	Endpoint: Height	CETIS Version: CETISv1.9.6		
Analyzed: 22 May-20 14:34	Analysis: Parametric-Control vs Ord.Treatments	Status Level: 1		
Batch ID: 00-5365-1199	Test Type: Vegetative Vigor Tier II	Analyst:		
Start Date: 15 Aug-19	Protocol: OCSPP 850.4150 Plant Vegetative Vigor	Diluent:		
Ending Date:	Species: Glycine max	Brine:		
Test Length: n/a	Taxon:	Source: Age: R1		
Sample ID: 14-5402-4357	Code: 51017505 direpr	Project:		
Sample Date: 15 Aug-19	Material: Dicamba DGA	Source: Monsanto Company		
Receipt Date:	CAS (PC):	Station:		
Sample Age: n/a	Client: CDM Smith - K. Bozicevich			

128931 51017505; Soybean yield; Reproductive (R1)

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	0.0011	0.0024	0.001625		5.93%

Williams Multiple Comparison Test

Control	vs	Conc-lbs ae/	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision($\alpha:5\%$)
Negative Control	0.00027	-0.705	1.734	2.952	6	CDF	>0.05	Non-Significant Effect	
	0.00055	-0.6609	1.818	3.095	6	CDF	>0.05	Non-Significant Effect	
	0.0011	0.4112	1.845	3.141	6	CDF	>0.05	Non-Significant Effect	
	0.0024*	2.614	1.859	3.164	6	CDF	<0.05	Significant Effect	
	0.0045*	5.331	1.867	3.178	6	CDF	<0.05	Significant Effect	

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Between	327.008	65.4017	5	11.29	4.8E-05	Significant Effect
Error	104.31	5.795	18			
Total	431.318		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:1\%$)
Variance	Bartlett Equality of Variance Test	5.825	15.09	0.3236	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.9472	0.884	0.2359	Normal Distribution

Height Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	53.62	51.51	55.74	53.1	52.7	55.6	0.6651	2.48%	0.00%
0.00027		4	54.82	50.53	59.12	54.85	51.5	58.1	1.349	4.92%	-2.24%
0.00055		4	54.75	48.09	61.41	55.7	49	58.6	2.093	7.65%	-2.10%
0.0011		4	52.92	49.92	55.93	52.85	50.7	55.3	0.9455	3.57%	1.31%
0.0024		4	49.18	46.59	51.76	49	47.5	51.2	0.8138	3.31%	8.30%
0.0045		4	44.55	42.31	46.79	44.05	43.5	46.6	0.703	3.16%	16.92%

Height Detail

Conc-lbs ae/A	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	53.1	52.7	53.1	55.6
0.00027		51.5	54.7	58.1	55
0.00055		49	54.5	56.9	58.6
0.0011		53.1	55.3	52.6	50.7
0.0024		51.2	47.5	49.7	48.3
0.0045		43.5	46.6	44.3	43.8

CETIS Analytical Report

Report Date: 22 May-20 14:39 (p 2 of 2)
Test Code/ID: 51017505 dre14 / 19-8782-5625

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

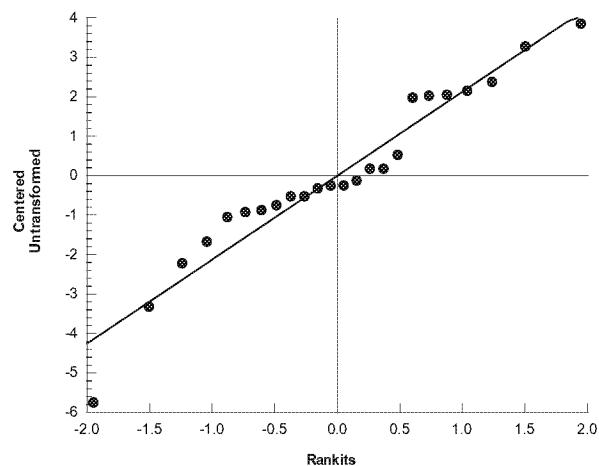
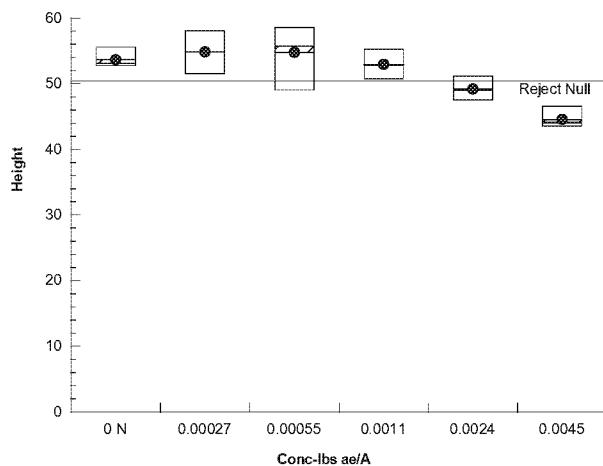
Syntech Research, Inc.

Analysis ID: 09-3750-1412
Analyzed: 22 May-20 14:34

Endpoint: Height
Analysis: Parametric-Control vs Ord.Treatments

CETIS Version: CETISv1.9.6
Status Level: 1

Graphics



CETIS Analytical Report

Report Date: 22 May-20 14:47 (p 1 of 2)
 Test Code/ID: 51017505 dv14 / 13-0749-7295

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Analysis ID:	04-1531-4328	Endpoint:	Height	CETIS Version:	CETISv1.9.6
Analyzed:	22 May-20 14:42	Analysis:	Parametric-Control vs Ord.Treatments	Status Level:	1
Batch ID:	18-7837-7561	Test Type:	Vegetative Vigor Tier II	Analyst:	
Start Date:	05 Aug-19	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:	
Ending Date:	22 May-20 14:40	Species:	Glycine max	Brine:	
Test Length:	291d 15h	Taxon:		Source:	Age:
Sample ID:	17-0601-6900	Code:	65AFC084	Project:	
Sample Date:	05 Aug-19	Material:	Dicamba DGA	Source:	Monsanto Company
Receipt Date:	22 May-20 14:40	CAS (PC):		Station:	
Sample Age:	n/a	Client:	CDM Smith - K. Bozicevich		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	0.00065	0.0013	0.0009192		5.44%

Williams Multiple Comparison Test

Control	vs	Conc-lbs ae/	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α :5%)
Negative Control		0.0003	0.7587	1.734	1.657	6	CDF	>0.05	Non-Significant Effect
		0.00065	1.413	1.818	1.737	6	CDF	>0.05	Non-Significant Effect
		0.0013*	6.148	1.845	1.763	6	CDF	<0.05	Significant Effect
		0.0027*	12.45	1.859	1.776	6	CDF	<0.05	Significant Effect
		0.0052*	14.91	1.867	1.784	6	CDF	<0.05	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α :5%)
Between	750.938	150.188	5	82.23	<1.0E-37	Significant Effect
Error	32.875	1.82639	18			
Total	783.813		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α :1%)
Variance	Bartlett Equality of Variance Test	4.76	15.09	0.4458	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.973	0.884	0.7417	Normal Distribution

Height Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	32.8	31.67	33.93	32.7	32.1	33.7	0.3536	2.16%	0.00%
0.0003		4	32.07	30.64	33.51	32.05	31	33.2	0.4498	2.80%	2.21%
0.00065		4	31.45	27.81	35.09	31	29.5	34.3	1.144	7.28%	4.12%
0.0013		4	26.93	25.15	28.7	26.9	25.6	28.3	0.5573	4.14%	17.91%
0.0027		4	20.9	19.17	22.63	20.7	19.8	22.4	0.5431	5.20%	36.28%
0.0052		4	18.55	16.31	20.79	18.5	16.9	20.3	0.7053	7.60%	43.45%

Height Detail

Conc-lbs ae/A	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	32.4	33	33.7	32.1
0.0003		31	32.1	32	33.2
0.00065		32.3	34.3	29.5	29.7
0.0013		27.1	25.6	26.7	28.3
0.0027		22.4	20.7	20.7	19.8
0.0052		20.3	18.8	18.2	16.9

CETIS Analytical Report

Report Date: 22 May-20 14:47 (p 2 of 2)
Test Code/ID: 51017505 dv14 / 13-0749-7295

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

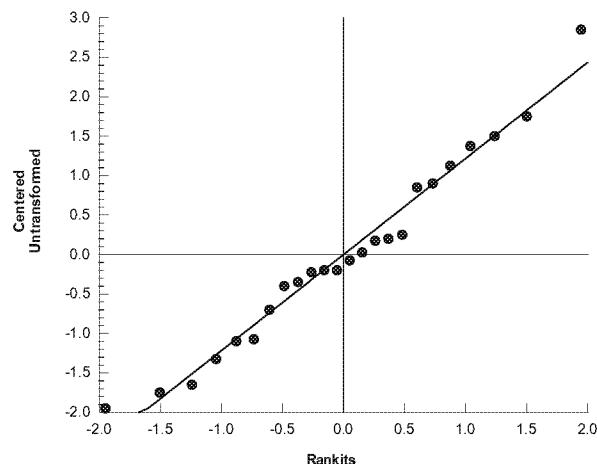
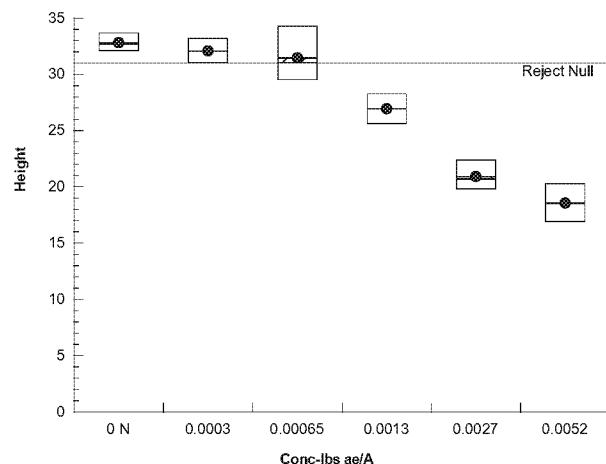
Syntech Research, Inc.

Analysis ID: 04-1531-4328
Analyzed: 22 May-20 14:42

Endpoint: Height
Analysis: Parametric-Control vs Ord.Treatments

CETIS Version: CETISv1.9.6
Status Level: 1

Graphics



CETIS Summary Report

Report Date: 06 Apr-20 19:10 (p 1 of 2)
 Test Code/ID: 51017505 glyrep / 00-9132-8485

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Batch ID:	14-6514-6439	Test Type:	Vegetative Vigor Tier II	Analyst:	
Start Date:	15 Aug-19 00:01	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:	
Ending Date:		Species:	Glycine max	Brine:	
Test Length:	n/a	Taxon:		Source:	Age: R1
Sample ID:	19-5673-4401	Code:	51017505 glyrep	Project:	
Sample Date:	15 Aug-19	Material:	Glyphosate	Source:	Monsanto Company
Receipt Date:		CAS (PC):		Station:	
Sample Age:	1m	Client:	CDM Smith - K. Bozicevich		

128931 51017505; Soybean yield; Reproductive (R1)

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓ NOEL	LOEL	TOEL	TU	PMSD	S
07-8361-8799	Height	Dunnett Multiple Comparison Test	✓ 0.00094	0.0022	0.001438		5.21%	1
07-9309-6204	Height	Williams Multiple Comparison Test	✓ 0.00094	0.0022	0.001438		4.04%	1
11-2386-8890	Weight	Dunnett Multiple Comparison Test	✓ 0.00094	0.0022	0.001438		18.5%	1
20-2283-8296	Weight	Williams Multiple Comparison Test	✓ 0.00094	0.0022	0.001438		14.3%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓ Level	Ibs ae/A	95% LCL	95% UCL	TU	S
18-7465-2476	Height	NLR: 3P Cum Log-Normal (Probit)	IC5	0.00123	0.000795	0.0017		1
			IC10	0.00258	0.002	0.00322		
			IC25	0.00889	0.00751	0.0104		
			IC50	0.0351	0.0219	0.0563		
15-8941-3559	Weight	NLR: 3P Cum Log-Normal (Probit)	✓ IC5	0.000431	n/a	0.0011		1
			✓ IC10	0.000975	0.000299	0.00194		
			✓ IC25	0.0038	0.00246	0.00559		
			✓ IC50	0.0173	0.00787	0.038		

Height Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	66	62.8	69.2	64.6	69	1	2.01	3.04%	0.00%
0.0004		4	64.7	62.3	67.1	62.5	65.8	0.752	1.5	2.32%	1.97%
0.00094		4	64.1	58.7	69.5	59.5	67.3	1.7	3.41	5.31%	2.92%
0.0022		4	59.8	56.9	62.7	58.3	62.5	0.925	1.85	3.09%	9.43%
0.0052		4	54.6	52.3	57	52.5	56	0.753	1.51	2.76%	17.23%
0.0094		4	48.9	47.3	50.4	48	49.9	0.484	0.967	1.98%	25.98%

Weight Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	3260	2810	3710	2910	3520	142	284	8.71%	0.00%
0.0004		4	3150	2730	3560	2760	3290	130	259	8.23%	3.39%
0.00094		4	3000	2370	3640	2560	3340	200	399	13.30%	7.83%
0.0022		4	2650	1970	3330	2070	3090	213	427	16.13%	18.75%
0.0052		4	2270	1810	2730	2070	2700	145	289	12.71%	30.17%
0.0094		4	2020	1360	2690	1430	2410	210	419	20.71%	37.85%

CETIS Summary ReportReport Date: 06 Apr-20 19:10 (p 2 of 2)
Test Code/ID: 51017505 glyrep / 00-9132-8485**OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)****Syntech Research, Inc.****Height Detail**

Conc-lbs ae/A	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	65.3	65.2	64.6	69
0.0004		62.5	65.4	65.8	65.2
0.00094		59.5	63.7	65.9	67.3
0.0022		59.2	62.5	59.2	58.3
0.0052		55.2	52.5	54.9	56
0.0094		48.1	49.5	49.9	48

Weight Detail

Conc-lbs ae/A	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	2910	3150	3450	3520
0.0004		2760	3250	3290	3290
0.00094		2560	2760	3340	3340
0.0022		2660	3090	2760	2070
0.0052		2110	2700	2220	2070
0.0094		2110	2160	2410	1430

CETIS Summary Report

Report Date: 06 Apr-20 19:15 (p 1 of 2)
 Test Code/ID: 51017505 glyveg / 20-3864-1226

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Batch ID:	16-7765-0677	Test Type:	Vegetative Vigor Tier II	Analyst:	
Start Date:	05 Aug-19 00:01	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:	
Ending Date:		Species:	Glycine max	Brine:	
Test Length:	n/a	Taxon:		Source:	Age: V3
Sample ID:	19-6413-1919	Code:	51017505 glyveg	Project:	
Sample Date:	05 Aug-19	Material:	Glyphosate	Source:	Monsanto Company
Receipt Date:		CAS (PC):		Station:	
Sample Age:	1m	Client:	CDM Smith - K. Bozicevich		

128931 51017505; Soybean yield; Vegetative Growth (V3)

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓ NOEL	LOEL	TOEL	TU	PMSD	S
04-9429-6347	Height	Dunnett Multiple Comparison Test	0.0003	0.001	0.0005477		7.67%	1
07-7249-0947	Height	Williams Multiple Comparison Test	✓ <0.0003	0.0003	n/a		5.95%	1
01-3228-3082	Weight	Dunnett Multiple Comparison Test	0.001	0.0022	0.001483		16.4%	1
20-0221-4917	Weight	Williams Multiple Comparison Test	✓ <0.0003	0.0003	n/a		12.7%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓ Level	Ibs ae/A	95% LCL	95% UCL	TU	S
04-7319-1052	Height	NLR: 3P Cum Log-Normal (Probit)	IC5	0.000268	0.000093	0.000477		1
			IC10	0.000602	0.000361	0.000892		
			IC25	0.00233	0.00185	0.00289		
			✓ IC50	0.0105	0.00797	0.0138		
06-7463-7803	Weight	NLR: 3P Cum Log-Normal (Probit)	✓ IC5	0.0000651	n/a	0.000319		1
			✓ IC10	0.000228	3.19E-05	0.000688		
			✓ IC25	0.00186	0.00105	0.00312		
			IC50	0.0191	0.0073	0.0502		

Height Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	61.8	59.2	64.3	59.6	63.5	0.805	1.61	2.61%	0.00%
0.0003		4	58.3	53.9	62.7	54.5	61	1.37	2.74	4.71%	5.59%
0.001		4	55.3	50.5	60.1	52.8	59	1.51	3.02	5.46%	10.40%
0.0022		4	46.6	41.5	51.8	42.8	50.6	1.61	3.23	6.93%	24.49%
0.0049		4	36	30.4	41.6	32.7	40.6	1.76	3.52	9.77%	41.70%
0.0096		4	34.3	30.9	37.7	31.5	36.6	1.06	2.11	6.16%	44.45%

Weight Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	3220	2970	3470	3000	3350	78.2	156	4.85%	0.00%
0.0003		4	2820	2490	3150	2600	3100	103	206	7.31%	12.48%
0.001		4	2740	1970	3510	2310	3290	242	484	17.67%	14.94%
0.0022		4	2260	2060	2460	2110	2410	62.7	125	5.55%	29.86%
0.0049		4	2040	1560	2520	1720	2440	151	301	14.81%	36.78%
0.0096		4	1940	1280	2590	1670	2540	205	411	21.21%	39.90%

CETIS Summary ReportReport Date: 06 Apr-20 19:15 (p 2 of 2)
Test Code/ID: 51017505 glyveg / 20-3864-1226**OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)****Syntech Research, Inc.****Height Detail**

Conc-lbs ae/A	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	61.9	62	63.5	59.6
0.0003		54.5	58.5	59.2	61
0.001		56.6	59	52.9	52.8
0.0022		45.9	42.8	47.2	50.6
0.0049		36.8	33.9	40.6	32.7
0.0096		34.8	34.3	36.6	31.5

Weight Detail

Conc-lbs ae/A	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	3000	3240	3350	3290
0.0003		2600	3100	2760	2810
0.001		3000	3290	2310	2360
0.0022		2110	2300	2210	2410
0.0049		1960	2020	2440	1720
0.0096		1860	1670	2540	1670

CETIS Analytical Report

Report Date: 06 Apr-20 19:08 (p 1 of 4)
 Test Code/ID: 51017505 glyrep / 00-9132-8485

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Analysis ID:	07-8361-8799	Endpoint:	Height	CETIS Version:	CETISv1.9.5
Analyzed:	06 Apr-20 19:05	Analysis:	Parametric-Control vs Treatments	Status Level:	1
Batch ID:	14-6514-6439	Test Type:	Vegetative Vigor Tier II	Analyst:	
Start Date:	15 Aug-19 00:01	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:	
Ending Date:		Species:	Glycine max	Brine:	
Test Length:	n/a	Taxon:		Source:	Age: R1

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	0.00094	0.0022	0.001438		5.21%

Dunnett Multiple Comparison Test

Control	vs	Conc-lbs ae/A	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision($\alpha:5\%$)
Negative Control	0.0004	0.909	2.41	3.44	6	CDF	0.4623	Non-Significant Effect	
	0.00094	1.35	2.41	3.44	6	CDF	0.2806	Non-Significant Effect	
	0.0022*	4.36	2.41	3.44	6	CDF	8.6E-04	Significant Effect	
	0.0052*	7.96	2.41	3.44	6	CDF	2.7E-05	Significant Effect	
	0.0094*	12	2.41	3.44	6	CDF	2.7E-05	Significant Effect	

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Outlier	Grubbs Extreme Value Test	2.57	2.8	0.1339	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Between	909.237	181.847	5	44.5	<1.0E-37	Significant Effect
Error	73.5525	4.08625	18			
Total	982.79		23			

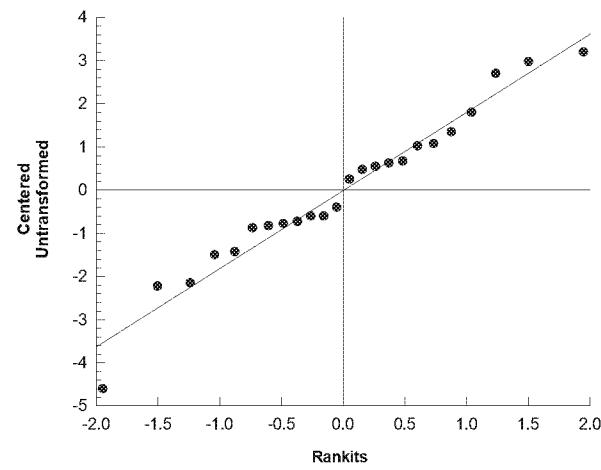
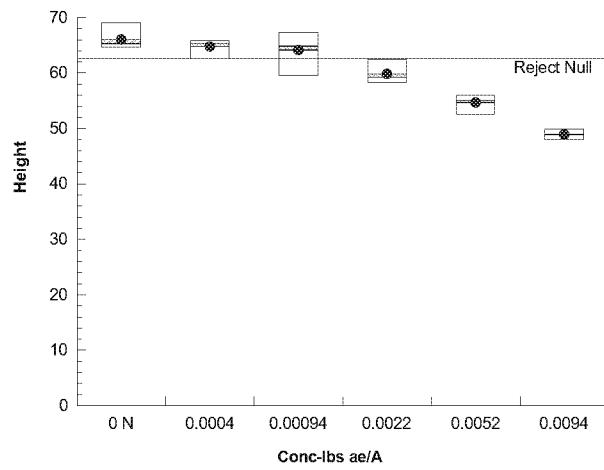
ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:1\%$)
Variance	Bartlett Equality of Variance Test	4.78	15.1	0.4427	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.968	0.884	0.6280	Normal Distribution

Height Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	66	62.8	69.2	65.2	64.6	69	1	3.04%	0.00%
0.0004		4	64.7	62.3	67.1	65.3	62.5	65.8	0.752	2.32%	1.97%
0.00094		4	64.1	58.7	69.5	64.8	59.5	67.3	1.7	5.31%	2.92%
0.0022		4	59.8	56.9	62.7	59.2	58.3	62.5	0.925	3.09%	9.43%
0.0052		4	54.7	52.3	57	55.1	52.5	56	0.753	2.76%	17.23%
0.0094		4	48.9	47.3	50.4	48.8	48	49.9	0.484	1.98%	25.98%

Graphics



CETIS Analytical Report

Report Date: 06 Apr-20 19:08 (p 2 of 4)
 Test Code/ID: 51017505 glyrep / 00-9132-8485

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Analysis ID:	07-9309-6204	Endpoint:	Height	CETIS Version:	CETISv1.9.5	
Analyzed:	06 Apr-20 19:06	Analysis:	Parametric-Control vs Ord.Treatments	Status Level:	1	
Batch ID:	14-6514-6439	Test Type:	Vegetative Vigor Tier II	Analyst:		
Start Date:	15 Aug-19 00:01	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:		
Ending Date:		Species:	Glycine max	Brine:		
Test Length:	n/a	Taxon:		Source:	Age: R1	
Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	0.00094	0.0022	0.001438		4.04%

Williams Multiple Comparison Test

Control	vs	Conc-lbs ae/	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision($\alpha:5\%$)
Negative Control	0.0004	0.909	1.73	2.48	6	CDF	>0.05	Non-Significant Effect	
	0.00094	1.35	1.82	2.6	6	CDF	>0.05	Non-Significant Effect	
	0.0022*	4.36	1.85	2.64	6	CDF	<0.05	Significant Effect	
	0.0052*	7.96	1.86	2.66	6	CDF	<0.05	Significant Effect	
	0.0094*	12	1.87	2.67	6	CDF	<0.05	Significant Effect	

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Outlier	Grubbs Extreme Value Test	2.57	2.8	0.1339	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Between	909.237	181.847	5	44.5	<1.0E-37	Significant Effect
Error	73.5525	4.08625	18			
Total	982.79		23			

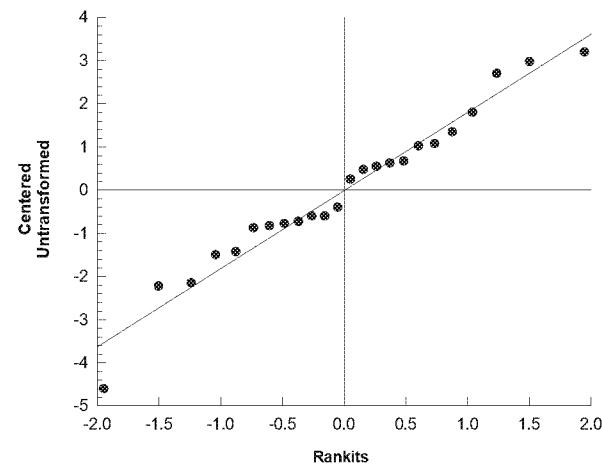
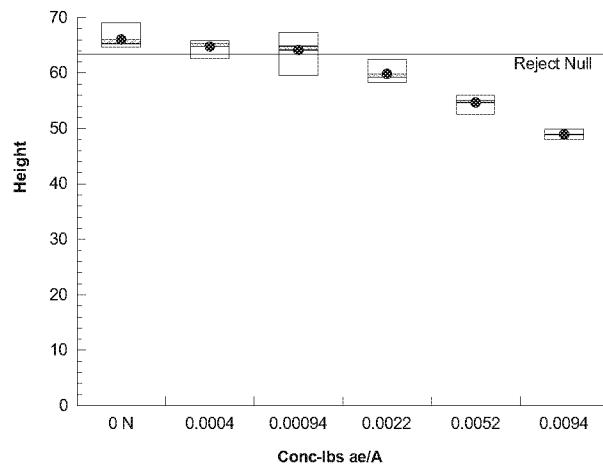
ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:1\%$)
Variance	Bartlett Equality of Variance Test	4.78	15.1	0.4427	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.968	0.884	0.6280	Normal Distribution

Height Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	66	62.8	69.2	65.2	64.6	69	1	3.04%	0.00%
0.0004		4	64.7	62.3	67.1	65.3	62.5	65.8	0.752	2.32%	1.97%
0.00094		4	64.1	58.7	69.5	64.8	59.5	67.3	1.7	5.31%	2.92%
0.0022		4	59.8	56.9	62.7	59.2	58.3	62.5	0.925	3.09%	9.43%
0.0052		4	54.7	52.3	57	55.1	52.5	56	0.753	2.76%	17.23%
0.0094		4	48.9	47.3	50.4	48.8	48	49.9	0.484	1.98%	25.98%

Graphics



CETIS Analytical Report

Report Date: 06 Apr-20 19:08 (p 3 of 4)
 Test Code/ID: 51017505 glyrep / 00-9132-8485

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Analysis ID:	11-2386-8890	Endpoint:	Weight	CETIS Version:	CETISv1.9.5
Analyzed:	06 Apr-20 19:05	Analysis:	Parametric-Control vs Treatments	Status Level:	1
Batch ID:	14-6514-6439	Test Type:	Vegetative Vigor Tier II	Analyst:	
Start Date:	15 Aug-19 00:01	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:	
Ending Date:		Species:	Glycine max	Brine:	
Test Length:	n/a	Taxon:		Source:	Age: R1

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	0.00094	0.0022	0.001438		18.46%

Dunnett Multiple Comparison Test

Control	vs	Conc-lbs ae/	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision($\alpha:5\%$)
Negative Control	0.0004	0.442	2.41	601	6	CDF	0.6723	Non-Significant Effect	
	0.00094	1.02	2.41	601	6	CDF	0.4127	Non-Significant Effect	
	0.0022*	2.45	2.41	601	6	CDF	0.0465	Significant Effect	
	0.0052*	3.93	2.41	601	6	CDF	0.0021	Significant Effect	
	0.0094*	4.94	2.41	601	6	CDF	2.7E-04	Significant Effect	

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Outlier	Grubbs Extreme Value Test	1.91	2.8	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Between	4951370	990274	5	7.94	4.2E-04	Significant Effect
Error	2245880	124771	18			
Total	7197250		23			

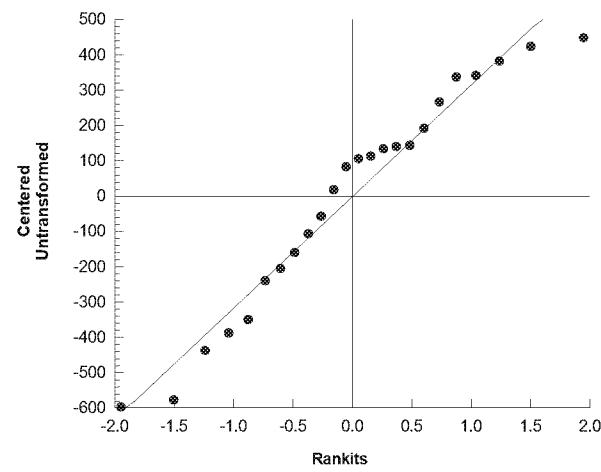
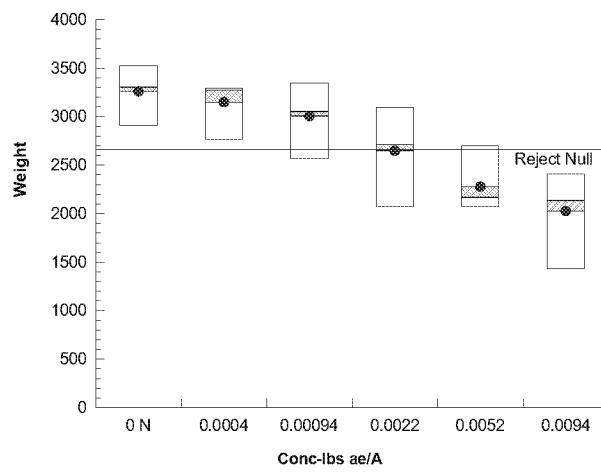
ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:1\%$)
Variance	Bartlett Equality of Variance Test	1.31	15.1	0.9341	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.947	0.884	0.2369	Normal Distribution

Weight Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	3260	2810	3710	3300	2910	3520	142	8.71%	0.00%
0.0004		4	3150	2730	3560	3270	2760	3290	130	8.23%	3.39%
0.00094		4	3000	2370	3640	3050	2560	3340	200	13.30%	7.83%
0.0022		4	2650	1970	3330	2710	2070	3090	213	16.13%	18.75%
0.0052		4	2270	1810	2730	2170	2070	2700	145	12.71%	30.17%
0.0094		4	2020	1360	2690	2130	1430	2410	210	20.71%	37.85%

Graphics



CETIS Analytical Report

Report Date: 06 Apr-20 19:08 (p 4 of 4)
 Test Code/ID: 51017505 glyrep / 00-9132-8485

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)					Syntech Research, Inc.			
Analysis ID:	20-2283-8296	Endpoint:	Weight	CETIS Version:	CETISv1.9.5			
Analyzed:	06 Apr-20 19:06	Analysis:	Parametric-Control vs Ord.Treatments	Status Level:	1			
Batch ID:	14-6514-6439	Test Type:	Vegetative Vigor Tier II	Analyst:				
Start Date:	15 Aug-19 00:01	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:				
Ending Date:		Species:	Glycine max	Brine:				
Test Length:	n/a	Taxon:		Source:	Age: R1			
Data Transform	Alt Hyp			NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T			0.00094	0.0022	0.001438		14.32%

Williams Multiple Comparison Test

Control	vs	Conc-lbs ae/	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision($\alpha:5\%$)
Negative Control	0.0004		0.442	1.73	433	6	CDF	>0.05	Non-Significant Effect
	0.00094		1.02	1.82	454	6	CDF	>0.05	Non-Significant Effect
	0.0022*		2.45	1.85	461	6	CDF	<0.05	Significant Effect
	0.0052*		3.93	1.86	464	6	CDF	<0.05	Significant Effect
	0.0094*		4.94	1.87	466	6	CDF	<0.05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Outlier	Grubbs Extreme Value Test	1.91	2.8	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Between	4951370	990274	5	7.94	4.2E-04	Significant Effect
Error	2245880	124771	18			
Total	7197250		23			

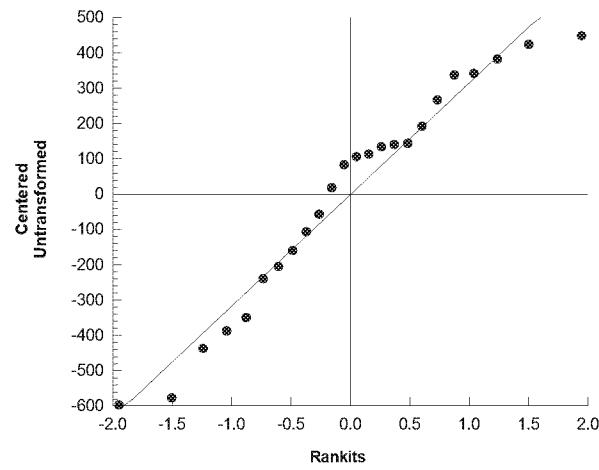
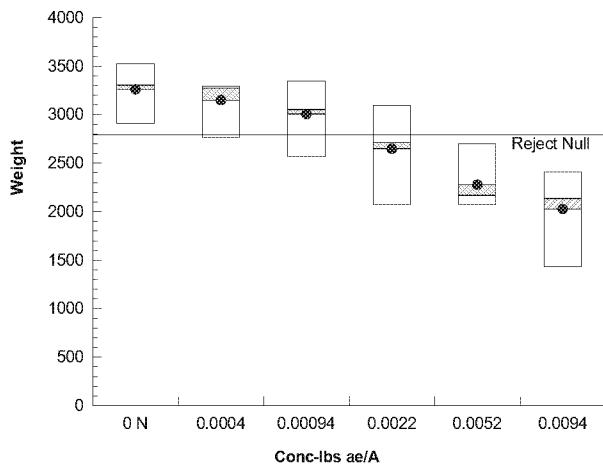
ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:1\%$)
Variance	Bartlett Equality of Variance Test	1.31	15.1	0.9341	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.947	0.884	0.2369	Normal Distribution

Weight Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	3260	2810	3710	3300	2910	3520	142	8.71%	0.00%
0.0004		4	3150	2730	3560	3270	2760	3290	130	8.23%	3.39%
0.00094		4	3000	2370	3640	3050	2560	3340	200	13.30%	7.83%
0.0022		4	2650	1970	3330	2710	2070	3090	213	16.13%	18.75%
0.0052		4	2270	1810	2730	2170	2070	2700	145	12.71%	30.17%
0.0094		4	2020	1360	2690	2130	1430	2410	210	20.71%	37.85%

Graphics



CETIS Analytical ReportReport Date: 06 Apr-20 19:09 (p 1 of 4)
Test Code/ID: 51017505 glyrep / 00-9132-8485**OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)****Syntech Research, Inc.**

Analysis ID:	18-7465-2476	Endpoint:	Height	CETIS Version:	CETISv1.9.5
Analyzed:	06 Apr-20 19:05	Analysis:	Nonlinear Regression (NLR)	Status Level:	1
Batch ID:	14-6514-6439	Test Type:	Vegetative Vigor Tier II	Analyst:	
Start Date:	15 Aug-19 00:01	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:	
Ending Date:		Species:	Glycine max	Brine:	
Test Length:	n/a	Taxon:		Source:	Age: R1

Non-Linear Regression Options

Model Name and Function			Weighting Function		PTBS Function	X Trans	Y Trans
3P Cum Log-Normal (Probit): $\mu = \alpha [1 - \Phi[\log(x/\delta)/\gamma]]$			Normal [$\omega=1$]		Off [$\mu^*=\mu$]	None	None

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	PMSE	Thresh	Optimize	F Stat	P-Value	Decision($\alpha:5\%$)
4	-14.4	36	38.3	0.9149	2.56%	66	Yes	0.232	0.8731	Non-Significant Lack of Fit

Point Estimates

Level	Ibs ae/A	95% LCL	95% UCL
IC5	0.00123	0.000795	0.0017
IC10	0.00258	0.002	0.00322
IC25	0.00889	0.00751	0.0104
IC50	0.0351	0.0219	0.0563

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision($\alpha:5\%$)
α	66	0.812	64.3	67.7	81.3	<1.0E-37	Significant Parameter
γ	2.04	0.284	1.45	2.63	7.18	4.5E-07	Significant Parameter
δ	0.0351	0.00744	0.0197	0.0506	4.72	1.2E-04	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Model	86400	28800	3	7920	<1.0E-37	Significant
Lack of Fit	2.84	0.946	3	0.232	0.8731	Non-Significant
Pure Error	73.6	4.09	18			
Residual	76.4	3.64	21			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Outlier	Grubbs Extreme Value Test	2.19	2.8	0.5174	No Outliers Detected
Variance	Bartlett Equality of Variance Test	4.78	11.1	0.4427	Equal Variances
	Mod Levene Equality of Variance	0.778	2.77	0.5784	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.241	2.49	0.7993	Normal Distribution
	Shapiro-Wilk W Normality Test	0.986	0.917	0.9734	Normal Distribution

Height Summary

Conc-lbs ae/A	Code	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	66	64.6	69	1	2.01	3.04%	0.0%
0.0004		4	64.7	62.5	65.8	0.752	1.5	2.32%	1.97%
0.00094		4	64.1	59.5	67.3	1.7	3.41	5.31%	2.92%
0.0022		4	59.8	58.3	62.5	0.925	1.85	3.09%	9.43%
0.0052		4	54.7	52.5	56	0.753	1.51	2.76%	17.2%
0.0094		4	48.9	48	49.9	0.484	0.967	1.98%	26.0%

CETIS Analytical Report

Report Date: 06 Apr-20 19:09 (p 2 of 4)
Test Code/ID: 51017505 glyrep / 00-9132-8485

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

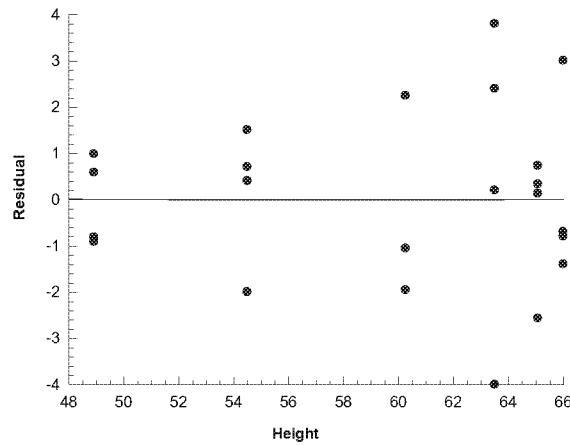
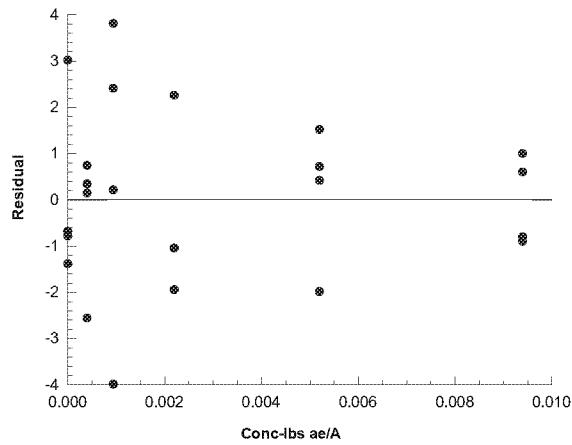
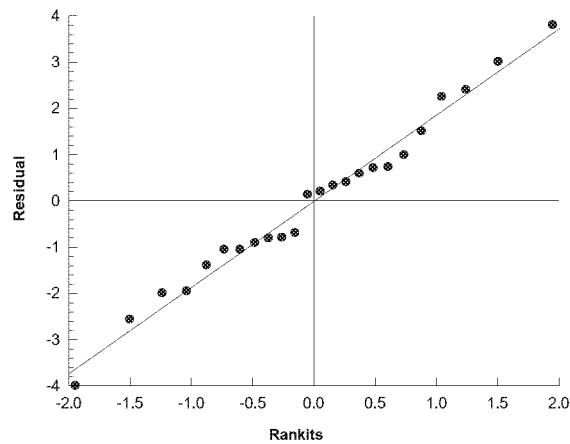
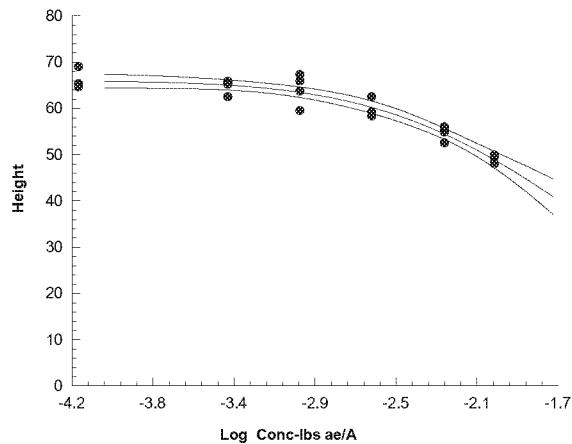
Analysis ID: 18-7465-2476
Analyzed: 06 Apr-20 19:05

Endpoint: Height
Analysis: Nonlinear Regression (NLR)

CETIS Version: CETISv1.9.5
Status Level: 1

Graphics

Model: 3P Cum Log-Normal (Probit): $\mu = \alpha \cdot [1 - \Phi[\log[x/\delta]/\gamma]]$ Distribution: Normal [$\omega=1$]



CETIS Analytical Report

Report Date: 06 Apr-20 19:09 (p 3 of 4)
 Test Code/ID: 51017505 glyrep / 00-9132-8485

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Analysis ID:	15-8941-3559	Endpoint:	Weight	CETIS Version:	CETISv1.9.5
Analyzed:	06 Apr-20 19:05	Analysis:	Nonlinear Regression (NLR)	Status Level:	1
Batch ID:	14-6514-6439	Test Type:	Vegetative Vigor Tier II	Analyst:	
Start Date:	15 Aug-19 00:01	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:	
Ending Date:		Species:	Glycine max	Brine:	
Test Length:	n/a	Taxon:		Source:	Age: R1

Non-Linear Regression Options

Model Name and Function		Weighting Function		PTBS Function	X Trans	Y Trans
3P Cum Log-Normal (Probit): $\mu = \alpha [1 - \Phi[\log[x/\delta]/\gamma]]$		Normal [$\omega=1$]		Off [$\mu^*=\mu$]	None	None

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	PMSE	Thresh	Optimize	F Stat	P-Value	Decision($\alpha:5\%$)
4	-138	283	286	0.6540	9.78%	3280	Yes	0.0745	0.9729	Non-Significant Lack of Fit

Point Estimates

Level	Ibs ae/A	95% LCL	95% UCL
IC5	0.000431	n/a	0.0011
IC10	0.000975	0.000299	0.00194
IC25	0.0038	0.00246	0.00559
IC50	0.0173	0.00787	0.038

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision($\alpha:5\%$)
α	3280	154	2960	3600	21.3	<1.0E-37	Significant Parameter
γ	2.24	0.659	0.872	3.61	3.4	0.0027	Significant Parameter
δ	0.0173	0.0061	0.0046	0.03	2.83	0.0100	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Model	183000000	61100000	3	564	<1.0E-37	Significant
Lack of Fit	27900	9290	3	0.0745	0.9729	Non-Significant
Pure Error	2250000	125000	18			
Residual	2270000	108000	21			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Outlier	Grubbs Extreme Value Test	1.98	2.8	0.9680	No Outliers Detected
Variance	Bartlett Equality of Variance Test	1.31	11.1	0.9341	Equal Variances
	Mod Levene Equality of Variance	0.367	2.77	0.8646	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.534	2.49	0.1756	Normal Distribution
	Shapiro-Wilk W Normality Test	0.937	0.917	0.1423	Normal Distribution

Weight Summary

Conc-lbs ae/A	Code	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	3260	2910	3520	142	284	8.71%	0.0%
0.0004		4	3150	2760	3290	130	259	8.23%	3.39%
0.00094		4	3000	2560	3340	200	399	13.30%	7.83%
0.0022		4	2650	2070	3090	213	427	16.10%	18.8%
0.0052		4	2270	2070	2700	145	289	12.70%	30.2%
0.0094		4	2020	1430	2410	210	419	20.70%	37.8%

CETIS Analytical Report

Report Date: 06 Apr-20 19:09 (p 4 of 4)
 Test Code/ID: 51017505 glyrep / 00-9132-8485

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

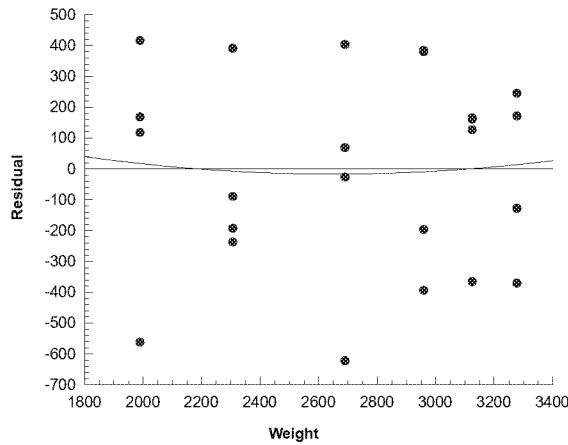
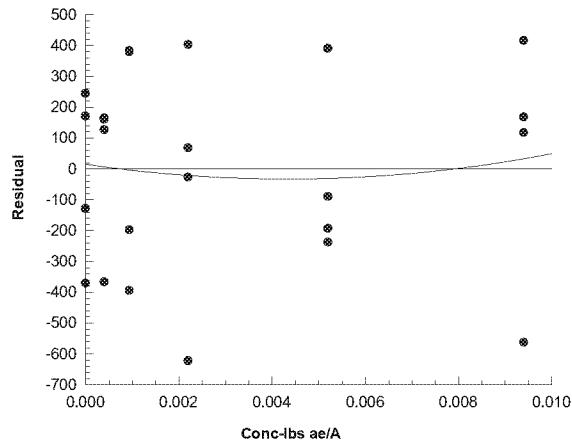
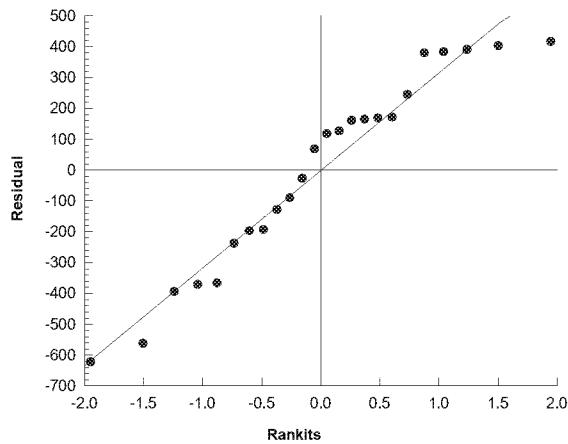
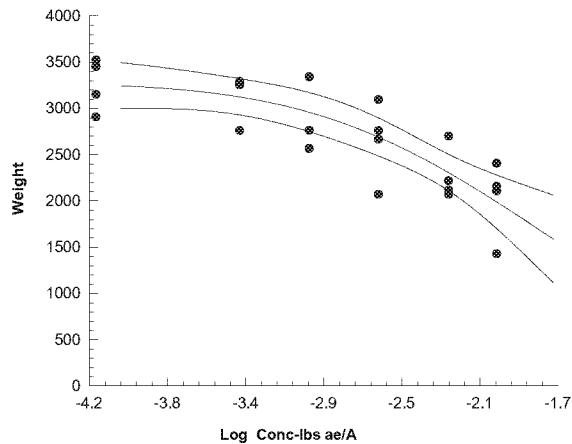
Analysis ID: 15-8941-3559
 Analyzed: 06 Apr-20 19:05

Endpoint: Weight
 Analysis: Nonlinear Regression (NLR)

CETIS Version: CETISv1.9.5
 Status Level: 1

Graphics

Model: 3P Cum Log-Normal (Probit): $\mu = \alpha \cdot [1 - \Phi[\log[x/\delta]/\gamma]]$ Distribution: Normal [$\omega=1$]



CETIS Analytical Report

Report Date: 06 Apr-20 19:14 (p 1 of 4)
 Test Code/ID: 51017505 glyveg / 20-3864-1226

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Analysis ID:	04-9429-6347	Endpoint:	Height	CETIS Version:	CETISv1.9.5			
Analyzed:	06 Apr-20 19:13	Analysis:	Parametric-Control vs Treatments	Status Level:	1			
Batch ID:	16-7765-0677	Test Type:	Vegetative Vigor Tier II	Analyst:				
Start Date:	05 Aug-19 00:01	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:				
Ending Date:		Species:	Glycine max	Brine:				
Test Length:	n/a	Taxon:		Source:	Age: V3			
Data Transform	Alt Hyp			NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T			0.0003	0.001	0.0005477		7.67%

Dunnett Multiple Comparison Test

Control	vs	Conc-lbs ae/	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision($\alpha:5\%$)
Negative Control		0.0003	1.75	2.41	4.74	6	CDF	0.1564	Non-Significant Effect
		0.001*	3.26	2.41	4.74	6	CDF	0.0089	Significant Effect
		0.0022*	7.68	2.41	4.74	6	CDF	2.8E-05	Significant Effect
		0.0049*	13.1	2.41	4.74	6	CDF	2.7E-05	Significant Effect
		0.0096*	13.9	2.41	4.74	6	CDF	2.7E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Outlier	Grubbs Extreme Value Test	1.87	2.8	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Between	2717.23	543.446	5	70.1	<1.0E-37	Significant Effect
Error	139.505	7.75028	18			
Total	2856.73		23			

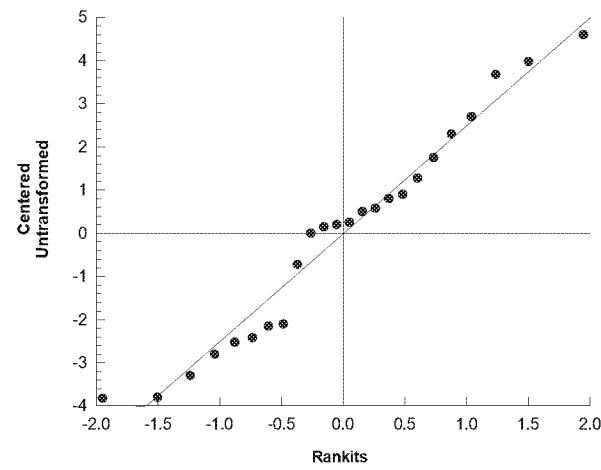
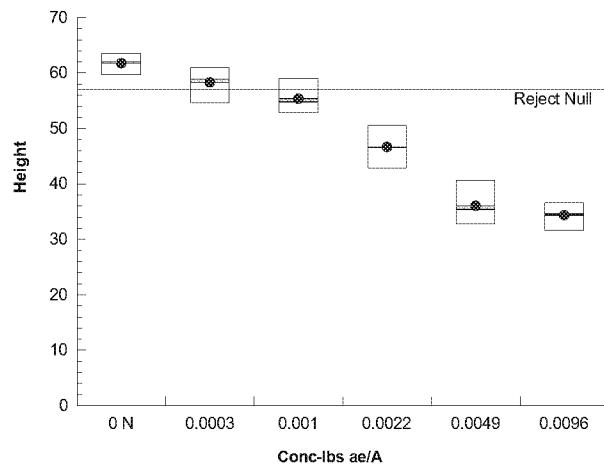
ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:1\%$)
Variance	Bartlett Equality of Variance Test	1.99	15.1	0.8503	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.956	0.884	0.3641	Normal Distribution

Height Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	61.8	59.2	64.3	62	59.6	63.5	0.805	2.61%	0.00%
0.0003		4	58.3	53.9	62.7	58.8	54.5	61	1.37	4.71%	5.59%
0.001		4	55.3	50.5	60.1	54.8	52.8	59	1.51	5.46%	10.40%
0.0022		4	46.6	41.5	51.8	46.6	42.8	50.6	1.61	6.93%	24.49%
0.0049		4	36	30.4	41.6	35.3	32.7	40.6	1.76	9.77%	41.70%
0.0096		4	34.3	30.9	37.7	34.5	31.5	36.6	1.06	6.16%	44.45%

Graphics



CETIS Analytical Report

Report Date: 06 Apr-20 19:14 (p 2 of 4)
 Test Code/ID: 51017505 glyveg / 20-3864-1226

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Analysis ID:	07-7249-0947	Endpoint:	Height	CETIS Version:	CETISv1.9.5		
Analyzed:	06 Apr-20 19:13	Analysis:	Parametric-Control vs Ord.Treatments	Status Level:	1		
Batch ID:	16-7765-0677	Test Type:	Vegetative Vigor Tier II	Analyst:			
Start Date:	05 Aug-19 00:01	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:			
Ending Date:		Species:	Glycine max	Brine:			
Test Length:	n/a	Taxon:		Source:	Age: V3		
Data Transform	Alt Hyp		NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T		<0.0003	0.0003	n/a		5.95%

Williams Multiple Comparison Test

Control	vs	Control II	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision($\alpha:5\%$)
Negative Control	0.0003*		1.75	1.73	3.41	6	CDF	<0.05	Significant Effect
	0.001*		3.26	1.82	3.58	6	CDF	<0.05	Significant Effect
	0.0022*		7.68	1.85	3.63	6	CDF	<0.05	Significant Effect
	0.0049*		13.1	1.86	3.66	6	CDF	<0.05	Significant Effect
	0.0096*		13.9	1.87	3.68	6	CDF	<0.05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Outlier	Grubbs Extreme Value Test	1.87	2.8	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Between	2717.23	543.446	5	70.1	<1.0E-37	Significant Effect
Error	139.505	7.75028	18			
Total	2856.73		23			

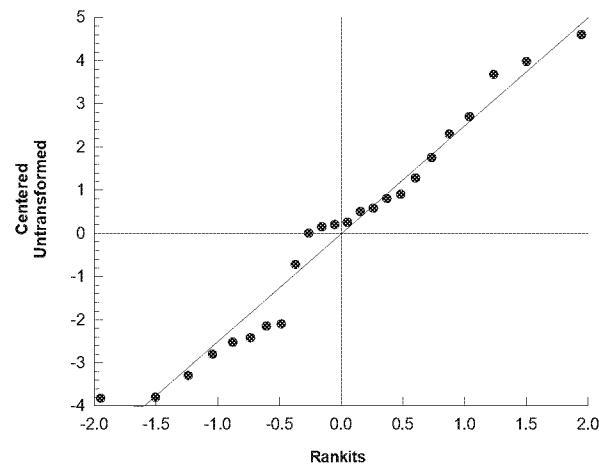
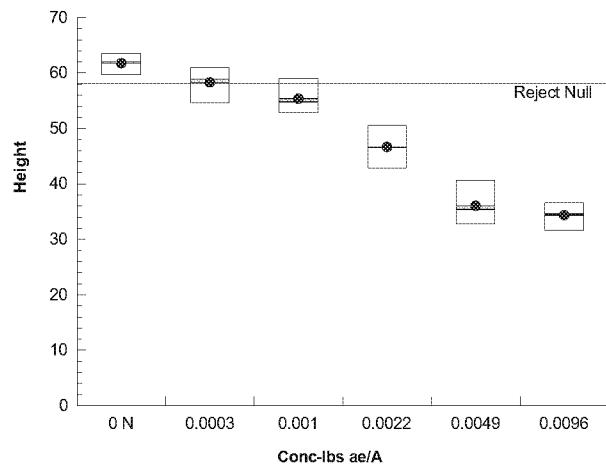
ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:1\%$)
Variance	Bartlett Equality of Variance Test	1.99	15.1	0.8503	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.956	0.884	0.3641	Normal Distribution

Height Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	61.8	59.2	64.3	62	59.6	63.5	0.805	2.61%	0.00%
0.0003		4	58.3	53.9	62.7	58.8	54.5	61	1.37	4.71%	5.59%
0.001		4	55.3	50.5	60.1	54.8	52.8	59	1.51	5.46%	10.40%
0.0022		4	46.6	41.5	51.8	46.6	42.8	50.6	1.61	6.93%	24.49%
0.0049		4	36	30.4	41.6	35.3	32.7	40.6	1.76	9.77%	41.70%
0.0096		4	34.3	30.9	37.7	34.5	31.5	36.6	1.06	6.16%	44.45%

Graphics



CETIS Analytical Report

Report Date: 06 Apr-20 19:14 (p 3 of 4)
 Test Code/ID: 51017505 glyveg / 20-3864-1226

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)				Syntech Research, Inc.		
Analysis ID:	01-3228-3082	Endpoint:	Weight	CETIS Version:	CETISv1.9.5	
Analyzed:	06 Apr-20 19:13	Analysis:	Parametric-Control vs Treatments	Status Level:	1	
Batch ID:	16-7765-0677	Test Type:	Vegetative Vigor Tier II	Analyst:		
Start Date:	05 Aug-19 00:01	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:		
Ending Date:		Species:	Glycine max	Brine:		
Test Length:	n/a	Taxon:		Source:	Age: V3	
Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	0.001	0.0022	0.001483		16.38%

Dunnett Multiple Comparison Test

Control	vs	Conc-lbs ae/	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision($\alpha:5\%$)
Negative Control	0.0003		1.83	2.41	527	6	CDF	0.1375	Non-Significant Effect
	0.001		2.2	2.41	527	6	CDF	0.0740	Non-Significant Effect
	0.0022*		4.39	2.41	527	6	CDF	8.1E-04	Significant Effect
	0.0049*		5.41	2.41	527	6	CDF	1.1E-04	Significant Effect
	0.0096*		5.86	2.41	527	6	CDF	6.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Outlier	Grubbs Extreme Value Test	2.19	2.8	0.5171	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Between	5079290	1015860	5	10.6	7.3E-05	Significant Effect
Error	1728540	96029.8	18			
Total	6807830		23			

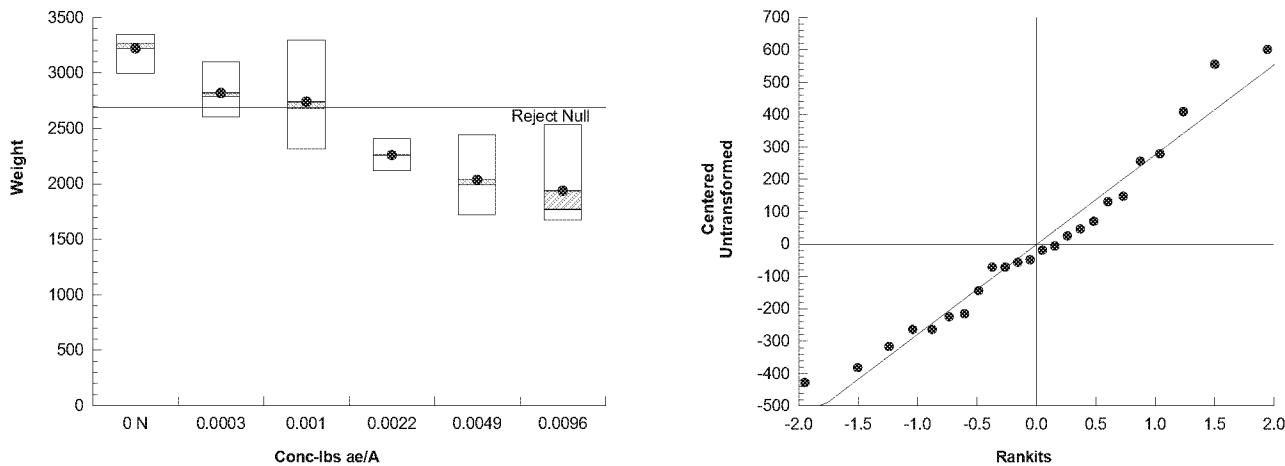
ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:1\%$)
Variance	Bartlett Equality of Variance Test	6.9	15.1	0.2284	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.956	0.884	0.3717	Normal Distribution

Weight Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	3220	2970	3470	3270	3000	3350	78.2	4.85%	0.00%
0.0003		4	2820	2490	3150	2790	2600	3100	103	7.31%	12.48%
0.001		4	2740	1970	3510	2680	2310	3290	242	17.67%	14.94%
0.0022		4	2260	2060	2460	2260	2110	2410	62.7	5.55%	29.86%
0.0049		4	2040	1560	2520	1990	1720	2440	151	14.81%	36.78%
0.0096		4	1940	1280	2590	1770	1670	2540	205	21.21%	39.90%

Graphics



CETIS Analytical Report

Report Date: 06 Apr-20 19:14 (p 4 of 4)
 Test Code/ID: 51017505 glyveg / 20-3864-1226

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)					Syntech Research, Inc.			
Analysis ID:	20-0221-4917	Endpoint:	Weight	CETIS Version:	CETISv1.9.5			
Analyzed:	06 Apr-20 19:13	Analysis:	Parametric-Control vs Ord.Treatments	Status Level:	1			
Batch ID:	16-7765-0677	Test Type:	Vegetative Vigor Tier II	Analyst:				
Start Date:	05 Aug-19 00:01	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:				
Ending Date:		Species:	Glycine max	Brine:				
Test Length:	n/a	Taxon:		Source:	Age: V3			
Data Transform	Alt Hyp			NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T			<0.0003	0.0003	n/a		12.70%

Williams Multiple Comparison Test

Control	vs	Control II	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision($\alpha:5\%$)
Negative Control	0.0003*		1.83	1.73	380	6	CDF	<0.05	Significant Effect
	0.001*		2.2	1.82	398	6	CDF	<0.05	Significant Effect
	0.0022*		4.39	1.85	404	6	CDF	<0.05	Significant Effect
	0.0049*		5.41	1.86	407	6	CDF	<0.05	Significant Effect
	0.0096*		5.86	1.87	409	6	CDF	<0.05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Outlier	Grubbs Extreme Value Test	2.19	2.8	0.5171	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Between	5079290	1015860	5	10.6	7.3E-05	Significant Effect
Error	1728540	96029.8	18			
Total	6807830		23			

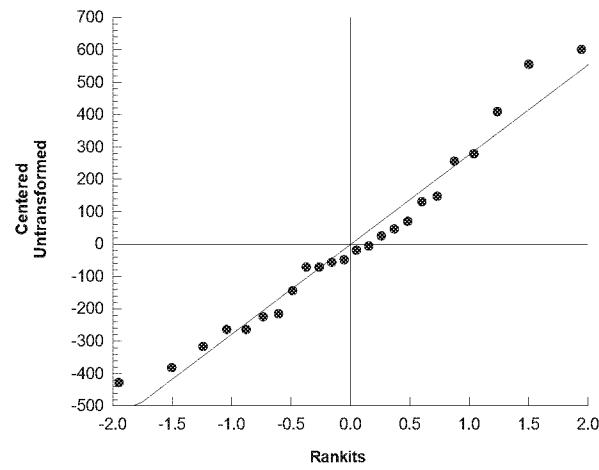
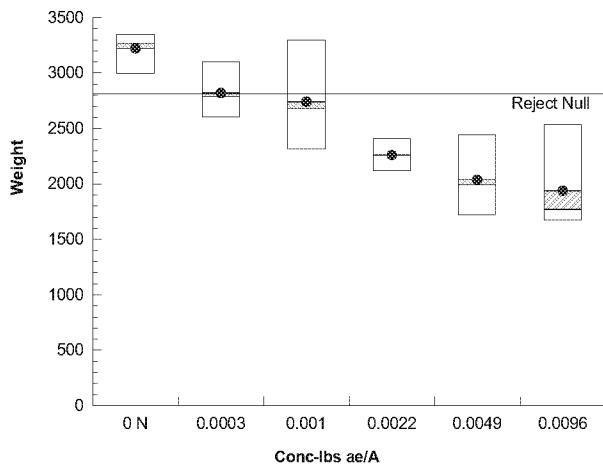
ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:1\%$)
Variance	Bartlett Equality of Variance Test	6.9	15.1	0.2284	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.956	0.884	0.3717	Normal Distribution

Weight Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	3220	2970	3470	3270	3000	3350	78.2	4.85%	0.00%
0.0003		4	2820	2490	3150	2790	2600	3100	103	7.31%	12.48%
0.001		4	2740	1970	3510	2680	2310	3290	242	17.67%	14.94%
0.0022		4	2260	2060	2460	2260	2110	2410	62.7	5.55%	29.86%
0.0049		4	2040	1560	2520	1990	1720	2440	151	14.81%	36.78%
0.0096		4	1940	1280	2590	1770	1670	2540	205	21.21%	39.90%

Graphics



CETIS Analytical Report

Report Date: 06 Apr-20 19:15 (p 1 of 4)
 Test Code/ID: 51017505 glyveg / 20-3864-1226

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Analysis ID:	04-7319-1052	Endpoint:	Height	CETIS Version:	CETISv1.9.5
Analyzed:	06 Apr-20 19:13	Analysis:	Nonlinear Regression (NLR)	Status Level:	1
Batch ID:	16-7765-0677	Test Type:	Vegetative Vigor Tier II	Analyst:	
Start Date:	05 Aug-19 00:01	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:	
Ending Date:		Species:	Glycine max	Brine:	
Test Length:	n/a	Taxon:		Source:	Age: V3

Non-Linear Regression Options

Model Name and Function		Weighting Function		PTBS Function	X Trans	Y Trans
3P Cum Log-Normal (Probit): $\mu = \alpha [1 - \Phi[\log(x/\delta)/\gamma]]$		Normal [$\omega=1$]		Off [$\mu^*=\mu$]	None	None

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	PMSE	Thresh	Optimize	F Stat	P-Value	Decision($\alpha:5\%$)
5	-27.5	62.2	64.5	0.9128	5.14%	62.1	Yes	3.79	0.0288	Significant Lack of Fit

Point Estimates

Level	Ibs ae/A	95% LCL	95% UCL
IC5	0.000268	0.000093	0.000477
IC10	0.000602	0.000361	0.000892
IC25	0.00233	0.00185	0.00289
IC50	0.0105	0.00797	0.0138

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision($\alpha:5\%$)
α	62.1	1.53	58.9	65.3	40.5	<1.0E-37	Significant Parameter
γ	2.23	0.278	1.65	2.81	8.02	<1.0E-37	Significant Parameter
δ	0.0105	0.00144	0.00749	0.0135	7.29	3.5E-07	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Model	59600	19900	3	1830	<1.0E-37	Significant
Lack of Fit	88.1	29.4	3	3.79	0.0288	Significant
Pure Error	140	7.75	18			
Residual	228	10.8	21			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Outlier	Grubbs Extreme Value Test	2.11	2.8	0.6645	No Outliers Detected
Variance	Bartlett Equality of Variance Test	1.99	11.1	0.8503	Equal Variances
	Mod Levene Equality of Variance	0.695	2.77	0.6341	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.339	2.49	0.5030	Normal Distribution
	Shapiro-Wilk W Normality Test	0.975	0.917	0.7931	Normal Distribution

Height Summary

Conc-lbs ae/A	Code	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	61.8	59.6	63.5	0.805	1.61	2.61%	0.0%
0.0003		4	58.3	54.5	61	1.37	2.74	4.71%	5.59%
0.001		4	55.3	52.8	59	1.51	3.02	5.46%	10.4%
0.0022		4	46.6	42.8	50.6	1.61	3.23	6.93%	24.5%
0.0049		4	36	32.7	40.6	1.76	3.52	9.77%	41.7%
0.0096		4	34.3	31.5	36.6	1.06	2.11	6.16%	44.5%

CETIS Analytical Report

Report Date: 06 Apr-20 19:15 (p 2 of 4)
 Test Code/ID: 51017505 glyveg / 20-3864-1226

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

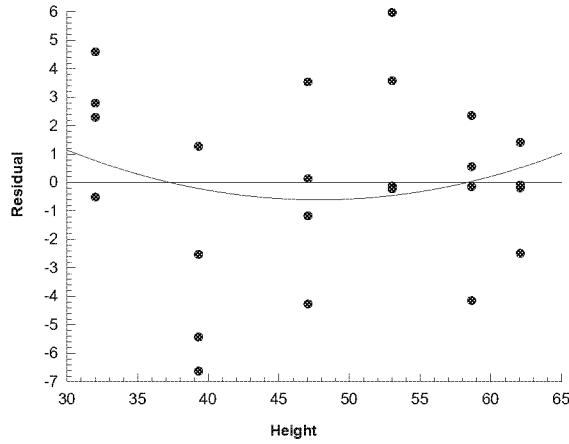
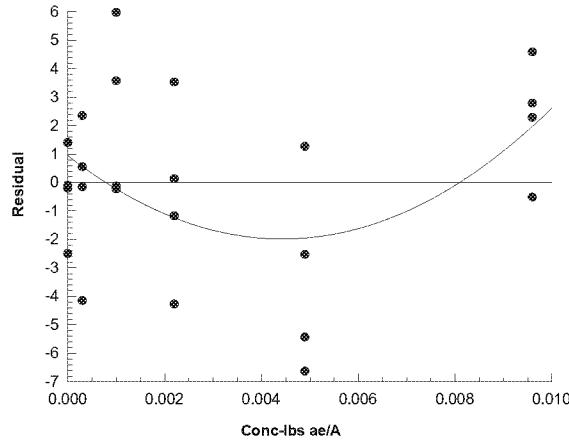
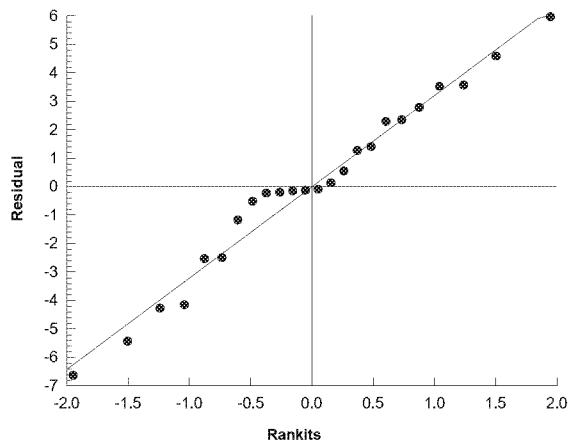
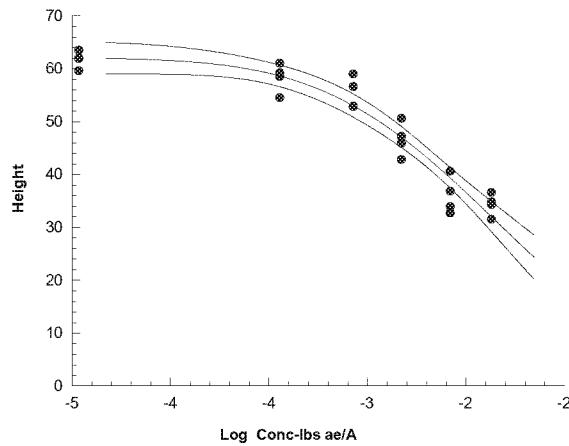
Analysis ID: 04-7319-1052
 Analyzed: 06 Apr-20 19:13

Endpoint: Height
 Analysis: Nonlinear Regression (NLR)

CETIS Version: CETISv1.9.5
 Status Level: 1

Graphics

Model: 3P Cum Log-Normal (Probit): $\mu = \alpha \cdot [1 - \Phi[\log[x/\delta]/\gamma]]$ Distribution: Normal [$\omega=1$]



CETIS Analytical Report

Report Date: 06 Apr-20 19:15 (p 3 of 4)
 Test Code/ID: 51017505 glyveg / 20-3864-1226

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Analysis ID:	06-7463-7803	Endpoint:	Weight	CETIS Version:	CETISv1.9.5
Analyzed:	06 Apr-20 19:13	Analysis:	Nonlinear Regression (NLR)	Status Level:	1
Batch ID:	16-7765-0677	Test Type:	Vegetative Vigor Tier II	Analyst:	
Start Date:	05 Aug-19 00:01	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:	
Ending Date:		Species:	Glycine max	Brine:	
Test Length:	n/a	Taxon:		Source:	Age: V3

Non-Linear Regression Options

Model Name and Function	Weighting Function	PTBS Function	X Trans	Y Trans
3P Cum Log-Normal (Probit): $\mu = \alpha [1 - \Phi[\log[x/\delta]/\gamma]]$	Normal [$\omega=1$]	Off [$\mu^*=\mu$]	None	None

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	PMSE	Thresh	Optimize	F Stat	P-Value	Decision($\alpha:5\%$)
3	-136	279	281	0.6930	9.61%	3220	Yes	0.624	0.6087	Non-Significant Lack of Fit

Point Estimates

Level	Ibs ae/A	95% LCL	95% UCL
IC5	0.0000651	n/a	0.000319
IC10	0.000228	3.19E-05	0.000688
IC25	0.00186	0.00105	0.00312
IC50	0.0191	0.0073	0.0502

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision($\alpha:5\%$)
α	3220	149	2910	3530	21.6	<1.0E-37	Significant Parameter
γ	3.46	0.875	1.64	5.27	3.95	7.3E-04	Significant Parameter
δ	0.0191	0.00896	0.000516	0.0378	2.14	0.0445	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Model	155000000	51700000	3	569	<1.0E-37	Significant
Lack of Fit	180000	59900	3	0.624	0.6087	Non-Significant
Pure Error	1730000	96000	18			
Residual	1910000	90900	21			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Outlier	Grubbs Extreme Value Test	2.44	2.8	0.2183	No Outliers Detected
Variance	Mod Levene Equality of Variance	1.6	2.77	0.2107	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	1.12	2.49	0.0064	Non-Normal Distribution
	Shapiro-Wilk W Normality Test	0.883	0.917	0.0095	Non-Normal Distribution

Weight Summary

Conc-lbs ae/A	Code	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	3220	3000	3350	78.2	156	4.85%	0.0%
0.0003		4	2820	2600	3100	103	206	7.31%	12.5%
0.001		4	2740	2310	3290	242	484	17.70%	14.9%
0.0022		4	2260	2110	2410	62.7	125	5.55%	29.9%
0.0049		4	2040	1720	2440	151	301	14.80%	36.8%
0.0096		4	1940	1670	2540	205	411	21.20%	39.9%

CETIS Analytical Report

Report Date: 06 Apr-20 19:15 (p 4 of 4)
 Test Code/ID: 51017505 glyveg / 20-3864-1226

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

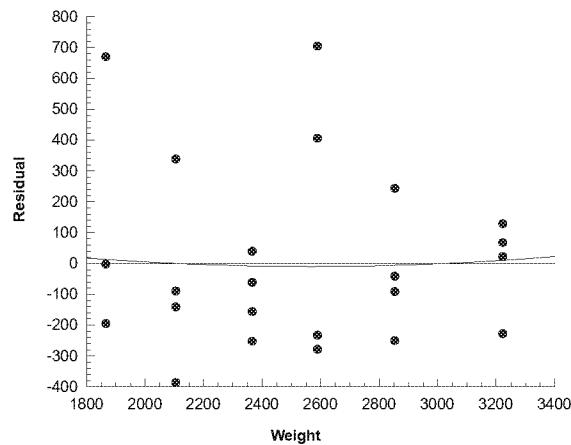
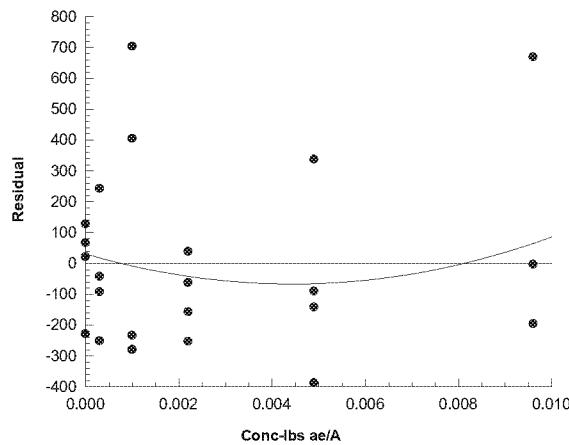
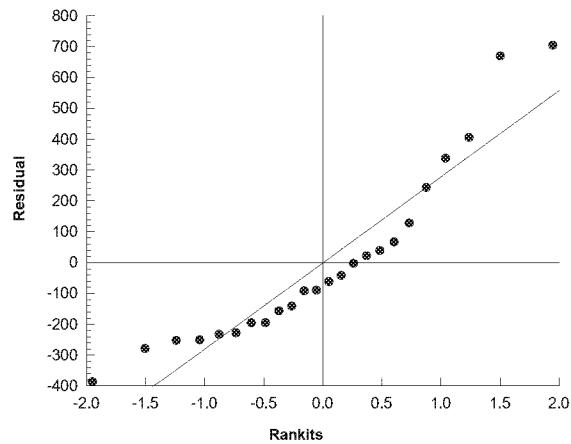
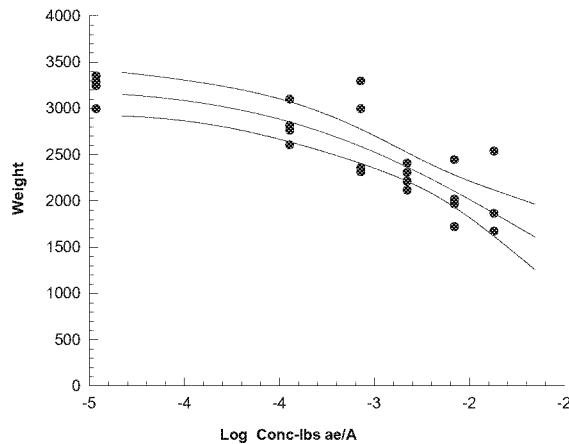
Analysis ID: 06-7463-7803
 Analyzed: 06 Apr-20 19:13

Endpoint: Weight
 Analysis: Nonlinear Regression (NLR)

CETIS Version: CETISv1.9.5
 Status Level: 1

Graphics

Model: 3P Cum Log-Normal (Probit): $\mu = \alpha \cdot [1 - \Phi[\log[x/\delta]/\gamma]]$ Distribution: Normal [$\omega=1$]



CETIS Analytical Report

Report Date: 22 May-20 14:52 (p 1 of 2)
 Test Code/ID: 51017505 gv14 / 06-4368-3919

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Analysis ID:	19-4882-4467	Endpoint:	Height	CETIS Version:	CETISv1.9.6
Analyzed:	22 May-20 14:50	Analysis:	Nonlinear Regression (NLR)	Status Level:	1
Batch ID:	12-4331-8287	Test Type:	Vegetative Vigor Tier II	Analyst:	
Start Date:	05 Aug-19 00:01	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:	
Ending Date:	22 May-20 10:45	Species:	Glycine max	Brine:	
Test Length:	291d 11h	Taxon:		Source:	Age:
Sample ID:	13-5467-1907	Code:	50BEA723	Project:	
Sample Date:	05 Aug-19	Material:	Glyphosate	Source:	Monsanto Company
Receipt Date:	22 May-20 10:45	CAS (PC):		Station:	
Sample Age:	1m	Client:	CDM Smith - K. Bozicevich		

Non-Linear Regression Options

Model Name and Function				Weighting Function			PTBS Function		X Trans	Y Trans
3P Cum Log-Normal (Probit): $\mu = \alpha \cdot [1 - \Phi[\log[x/\delta]/\gamma]]$				Normal [$\omega=1$]			Off [$\mu^*=\mu$]		None	None

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	PMSD	Thresh	Optimize	F Stat	P-Value	Decision($\alpha:5\%$)
10	-9.95	27.1	29.43	0.9264	4.17%	33.07	Yes	3.618	0.0333	Sig Lack of Fit

Point Estimates

Level	Ibs ae/A	95% LCL	95% UCL
IC5	0.0005953	0.000308	0.0008907
IC10	0.001135	0.0007831	0.001521
IC15	0.001755	0.001331	0.002227
IC20	0.002482	0.001998	0.003021
IC25	0.00334	0.002801	0.003939
IC40	0.00706	0.006008	0.008266
IC50	0.01108	0.008888	0.0138

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision($\alpha:5\%$)
α	33.07	0.6635	31.69	34.45	49.84	<1.0E-37	Significant Parameter
γ	1.777	0.2123	1.336	2.219	8.372	<1.0E-37	Significant Parameter
δ	0.01108	0.001166	0.008651	0.0135	9.501	<1.0E-37	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Model	18380	6126	3	2441	<1.0E-37	Significant Effect
Lack of Fit	19.83	6.608	3	3.618	0.0333	Significant Effect
Pure Error	32.88	1.826	18			
Residual	52.7	2.51	21			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Variance	Bartlett Equality of Variance Test	4.76	11.07	0.4458	Equal Variances
	Mod Levene Equality of Variance	1.831	2.773	0.1574	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.5571	2.492	0.1540	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9443	0.9169	0.2034	Normal Distribution

Height Summary

Conc-lbs ae/A	Code	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	
0	N	4	32.8	32.1	33.7	0.3536	0.7071	2.16%	0.0%
0.0003		4	32.07	31	33.2	0.4498	0.8995	2.80%	2.21%
0.001		4	31.45	29.5	34.3	1.144	2.288	7.28%	4.12%
0.0022		4	26.93	25.6	28.3	0.5573	1.115	4.14%	17.91%
0.0049		4	20.9	19.8	22.4	0.5431	1.086	5.20%	36.28%
0.0096		4	18.55	16.9	20.3	0.7053	1.411	7.61%	43.45%

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

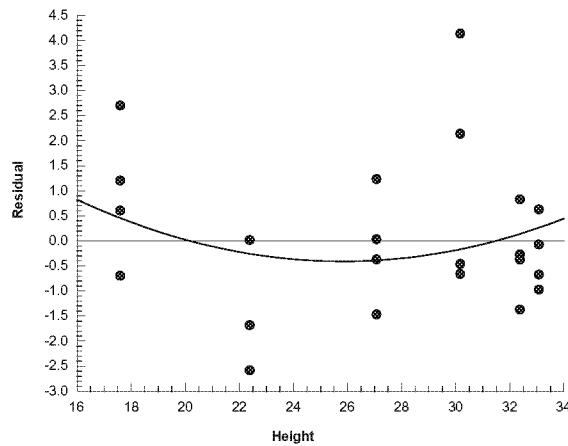
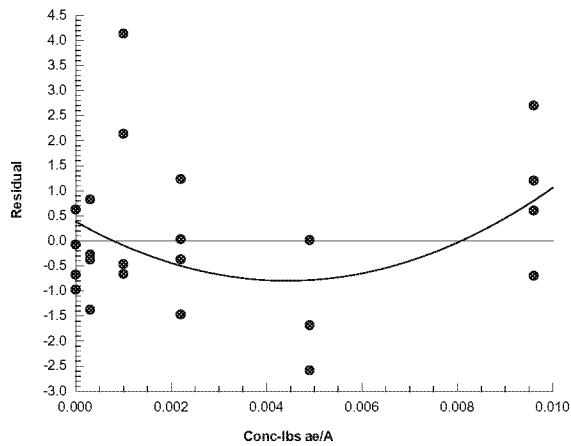
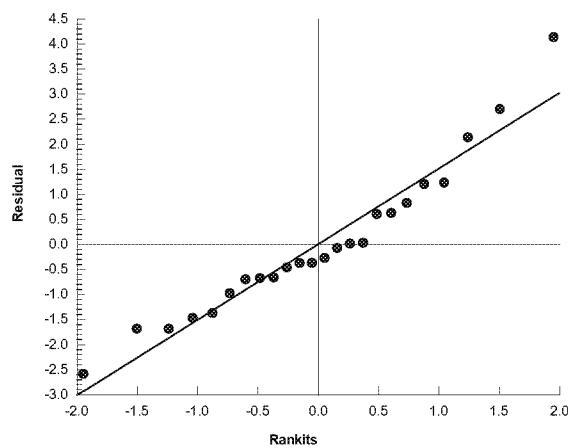
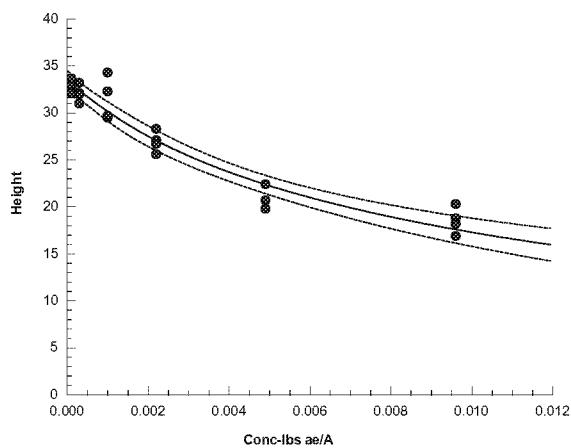
Analysis ID: 19-4882-4467 Endpoint: Height
 Analyzed: 22 May-20 14:50 Analysis: Nonlinear Regression (NLR)

CETIS Version: CETISv1.9.6
 Status Level: 1

Height Detail

Conc-lbs ae/A	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	32.4	33	33.7	32.1
0.0003		31	32.1	32	33.2
0.001		32.3	34.3	29.5	29.7
0.0022		27.1	25.6	26.7	28.3
0.0049		22.4	20.7	20.7	19.8
0.0096		20.3	18.8	18.2	16.9

Graphics

Model: 3P Cum Log-Normal (Probit): $\mu = \alpha [1 - \Phi[\log[x/\delta]/\gamma]]$ Distribution: Normal [$\omega=1$]

CETIS Analytical Report

Report Date: 22 May-20 14:48 (p 1 of 2)
 Test Code/ID: 51017505 gr14 / 16-4163-9156

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Analysis ID:	16-0665-3946	Endpoint:	Height	CETIS Version:	CETISv1.9.6
Analyzed:	22 May-20 10:51	Analysis:	Nonlinear Regression (NLR)	Status Level:	1
Batch ID:	16-9108-1499	Test Type:	Vegetative Vigor Tier II	Analyst:	
Start Date:	15 Aug-19 00:01	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:	
Ending Date:	22 May-20 10:46	Species:	Glycine max	Brine:	
Test Length:	281d 11h	Taxon:		Source:	Age:
Sample ID:	15-8933-5144	Code:	5EBB5468	Project:	
Sample Date:	15 Aug-19	Material:	Glyphosate	Source:	Monsanto Company
Receipt Date:	22 May-20 10:46	CAS (PC):		Station:	
Sample Age:	1m	Client:	CDM Smith - K. Bozicevich		

Non-Linear Regression Options

Model Name and Function			Weighting Function			PTBS Function		X Trans	Y Trans
3P Cum Log-Normal (Probit): $\mu = \alpha \cdot [1 - \Phi[\log[x/\delta]/\gamma]]$			Normal [$\omega=1$]			Off [$\mu^*=\mu$]		None	None

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	PMSD	Thresh	Optimize	F Stat	P-Value	Decision($\alpha:5\%$)
10	-18.72	44.64	46.97	0.7221	2.82%	54.46	Yes	0.2947	0.8287	Non-Sig Lack of Fit

Point Estimates

Level	Ibs ae/A	95% LCL	95% UCL
IC5	0.003286	0.001575	0.004822
IC10	0.00549	0.00405	0.006962
IC15	0.007761	0.006294	0.009306
IC20	0.01022	0.007763	0.01294
IC25	0.01294	0.008728	0.01801
IC40	0.02346	0.01101	0.04543
IC50	0.03356	0.01297	0.08687

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision($\alpha:5\%$)
α	54.46	0.7387	52.93	56	73.72	<1.0E-37	Significant Parameter
γ	1.413	0.4209	0.5374	2.288	3.356	0.0030	Significant Parameter
δ	0.03356	0.01392	0.004604	0.06252	2.41	0.0252	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Model	64330	21440	3	4115	<1.0E-37	Significant Effect
Lack of Fit	5.123	1.708	3	0.2947	0.8287	Non-Significant Effect
Pure Error	104.3	5.795	18			
Residual	109.4	5.211	21			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision($\alpha:5\%$)
Variance	Bartlett Equality of Variance Test	5.825	11.07	0.3236	Equal Variances
	Mod Levene Equality of Variance	1.102	2.773	0.3936	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.2147	2.492	0.8857	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9855	0.9169	0.9726	Normal Distribution

Height Summary

Conc-lbs ae/A	Code	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	
0	N	4	53.62	52.7	55.6	0.6651	1.33	2.48%	0.0%
0.0004		4	54.82	51.5	58.1	1.349	2.697	4.92%	-2.24%
0.00094		4	54.75	49	58.6	2.093	4.186	7.65%	-2.1%
0.0022		4	52.92	50.7	55.3	0.9455	1.891	3.57%	1.31%
0.0052		4	49.18	47.5	51.2	0.8138	1.628	3.31%	8.3%
0.0094		4	44.55	43.5	46.6	0.703	1.406	3.16%	16.92%

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

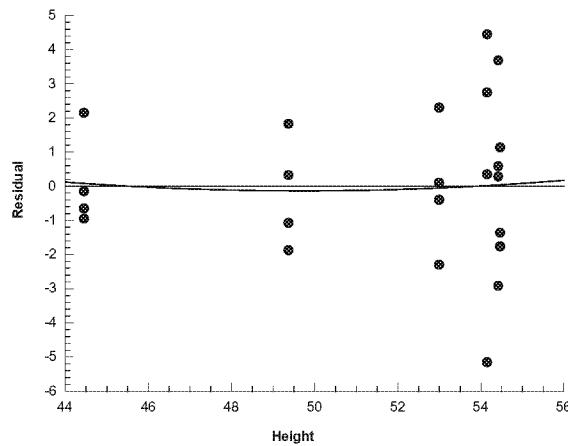
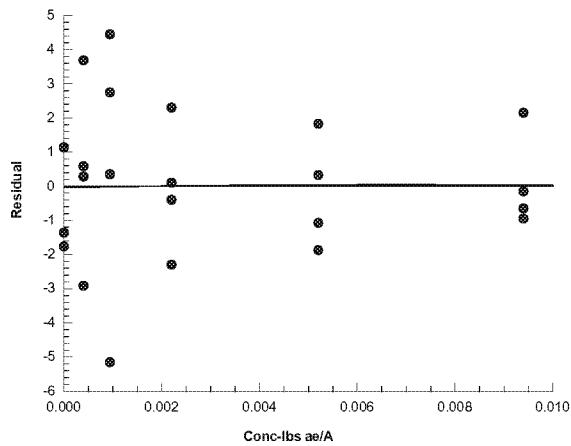
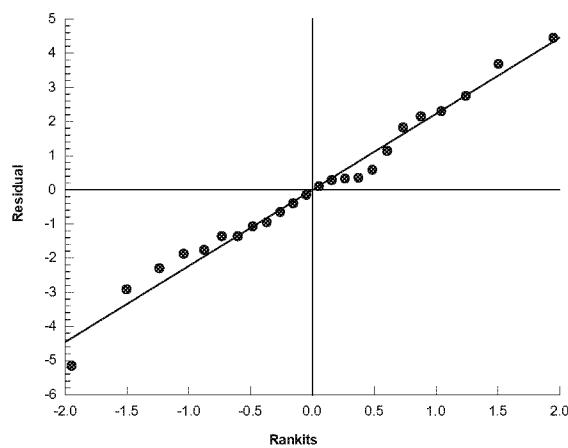
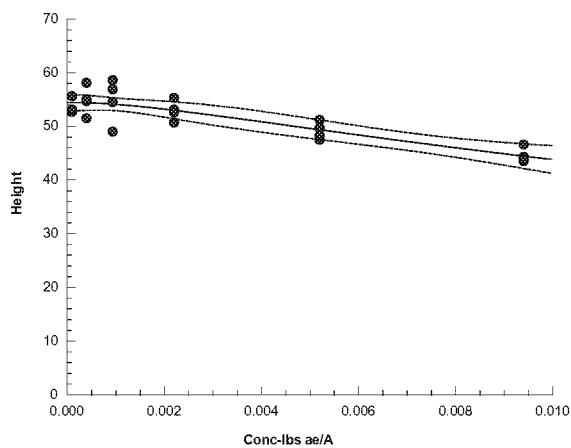
Syntech Research, Inc.

Analysis ID: 16-0665-3946
Analyzed: 22 May-20 10:51Endpoint: Height
Analysis: Nonlinear Regression (NLR)CETIS Version: CETISv1.9.6
Status Level: 1

Height Detail

Conc-lbs ae/A	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	53.1	52.7	53.1	55.6
0.0004		51.5	54.7	58.1	55
0.00094		49	54.5	56.9	58.6
0.0022		53.1	55.3	52.6	50.7
0.0052		51.2	47.5	49.7	48.3
0.0094		43.5	46.6	44.3	43.8

Graphics

Model: 3P Cum Log-Normal (Probit): $\mu=\alpha[1-\Phi[\log[x/\delta]/\gamma]]$ Distribution: Normal [$\omega=1$]

CETIS Analytical Report

Report Date: 22 May-20 14:48 (p 1 of 2)
 Test Code/ID: 51017505 gr14 / 16-4163-9156

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Analysis ID:	18-0739-3060	Endpoint:	Height	CETIS Version:	CETISv1.9.6
Analyzed:	22 May-20 10:50	Analysis:	Parametric-Control vs Ord.Treatments	Status Level:	1
Batch ID:	16-9108-1499	Test Type:	Vegetative Vigor Tier II	Analyst:	
Start Date:	15 Aug-19 00:01	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:	
Ending Date:	22 May-20 10:46	Species:	Glycine max	Brine:	
Test Length:	281d 11h	Taxon:		Source:	Age:
Sample ID:	15-8933-5144	Code:	5EBB5468	Project:	
Sample Date:	15 Aug-19	Material:	Glyphosate	Source:	Monsanto Company
Receipt Date:	22 May-20 10:46	CAS (PC):		Station:	
Sample Age:	1m	Client:	CDM Smith - K. Bozicevich		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	0.0022	0.0052	0.003382		5.93%

Williams Multiple Comparison Test

Control	vs	Conc-lbs ae/	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision($\alpha:5\%$)
Negative Control	0.0004	-0.705	1.734	2.952	6	CDF	>0.05	Non-Significant Effect	
	0.00094	-0.6609	1.818	3.095	6	CDF	>0.05	Non-Significant Effect	
	0.0022	0.4112	1.845	3.141	6	CDF	>0.05	Non-Significant Effect	
	0.0052*	2.614	1.859	3.164	6	CDF	<0.05	Significant Effect	
	0.0094*	5.331	1.867	3.178	6	CDF	<0.05	Significant Effect	

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision($\alpha:5\%$)
Between	327.008	65.4017	5	11.29	4.8E-05	Significant Effect
Error	104.31	5.795	18			
Total	431.318		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision($\alpha:1\%$)
Variance	Bartlett Equality of Variance Test	5.825	15.09	0.3236	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.9472	0.884	0.2359	Normal Distribution

Height Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	53.62	51.51	55.74	53.1	52.7	55.6	0.6651	2.48%	0.00%
0.0004		4	54.82	50.53	59.12	54.85	51.5	58.1	1.349	4.92%	-2.24%
0.00094		4	54.75	48.09	61.41	55.7	49	58.6	2.093	7.65%	-2.10%
0.0022		4	52.92	49.92	55.93	52.85	50.7	55.3	0.9455	3.57%	1.31%
0.0052		4	49.18	46.59	51.76	49	47.5	51.2	0.8138	3.31%	8.30%
0.0094		4	44.55	42.31	46.79	44.05	43.5	46.6	0.703	3.16%	16.92%

Height Detail

Conc-lbs ae/A	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	53.1	52.7	53.1	55.6
0.0004		51.5	54.7	58.1	55
0.00094		49	54.5	56.9	58.6
0.0022		53.1	55.3	52.6	50.7
0.0052		51.2	47.5	49.7	48.3
0.0094		43.5	46.6	44.3	43.8

CETIS Analytical Report

Report Date: 22 May-20 14:48 (p 2 of 2)
Test Code/ID: 51017505 gr14 / 16-4163-9156

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Analysis ID: 18-0739-3060

Endpoint: Height

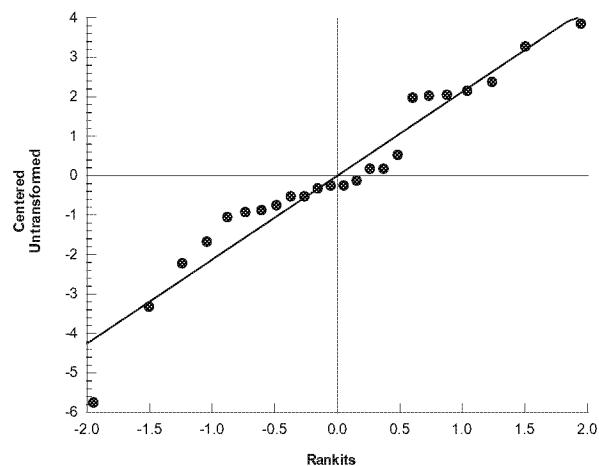
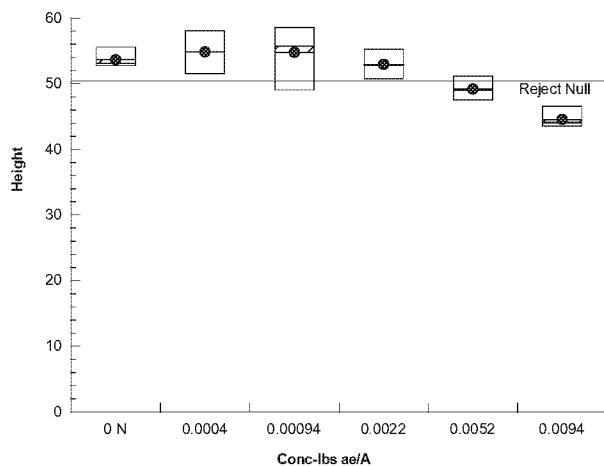
Analyzed: 22 May-20 10:50

Analysis: Parametric-Control vs Ord.Treatments

CETIS Version: CETISv1.9.6

Status Level: 1

Graphics



CETIS Analytical Report

Report Date: 22 May-20 14:52 (p 1 of 2)
 Test Code/ID: 51017505 gv14 / 06-4368-3919

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Analysis ID:	13-6815-4250	Endpoint:	Height	CETIS Version:	CETISv1.9.6
Analyzed:	22 May-20 14:50	Analysis:	Parametric-Control vs Ord.Treatments	Status Level:	1
Batch ID:	12-4331-8287	Test Type:	Vegetative Vigor Tier II	Analyst:	
Start Date:	05 Aug-19 00:01	Protocol:	OCSPP 850.4150 Plant Vegetative Vigor	Diluent:	
Ending Date:	22 May-20 10:45	Species:	Glycine max	Brine:	
Test Length:	291d 11h	Taxon:		Source:	Age:
Sample ID:	13-5467-1907	Code:	50BEA723	Project:	
Sample Date:	05 Aug-19	Material:	Glyphosate	Source:	Monsanto Company
Receipt Date:	22 May-20 10:45	CAS (PC):		Station:	
Sample Age:	1m	Client:	CDM Smith - K. Bozicevich		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	0.001	0.0022	0.001483		5.44%

Williams Multiple Comparison Test

Control	vs	Conc-lbs ae/	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α :5%)
Negative Control	0.0003	0.7587	1.734	1.657	6	CDF	>0.05	Non-Significant Effect	
	0.001	1.413	1.818	1.737	6	CDF	>0.05	Non-Significant Effect	
	0.0022*	6.148	1.845	1.763	6	CDF	<0.05	Significant Effect	
	0.0049*	12.45	1.859	1.776	6	CDF	<0.05	Significant Effect	
	0.0096*	14.91	1.867	1.784	6	CDF	<0.05	Significant Effect	

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α :5%)
Between	750.938	150.188	5	82.23	<1.0E-37	Significant Effect
Error	32.875	1.82639	18			
Total	783.813		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α :1%)
Variance	Bartlett Equality of Variance Test	4.76	15.09	0.4458	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.973	0.884	0.7417	Normal Distribution

Height Summary

Conc-lbs ae/A	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	32.8	31.67	33.93	32.7	32.1	33.7	0.3536	2.16%	0.00%
0.0003		4	32.07	30.64	33.51	32.05	31	33.2	0.4498	2.80%	2.21%
0.001		4	31.45	27.81	35.09	31	29.5	34.3	1.144	7.28%	4.12%
0.0022		4	26.93	25.15	28.7	26.9	25.6	28.3	0.5573	4.14%	17.91%
0.0049		4	20.9	19.17	22.63	20.7	19.8	22.4	0.5431	5.20%	36.28%
0.0096		4	18.55	16.31	20.79	18.5	16.9	20.3	0.7053	7.60%	43.45%

Height Detail

Conc-lbs ae/A	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	32.4	33	33.7	32.1
0.0003		31	32.1	32	33.2
0.001		32.3	34.3	29.5	29.7
0.0022		27.1	25.6	26.7	28.3
0.0049		22.4	20.7	20.7	19.8
0.0096		20.3	18.8	18.2	16.9

CETIS Analytical Report

Report Date: 22 May-20 14:52 (p 2 of 2)
Test Code/ID: 51017505 gv14 / 06-4368-3919

OCSPP 850.4150 Terrestrial Plant Tier II (Vegetative Vigor)

Syntech Research, Inc.

Analysis ID: 13-6815-4250
Analyzed: 22 May-20 14:50

Endpoint: Height
Analysis: Parametric-Control vs Ord.Treatments

CETIS Version: CETISv1.9.6
Status Level: 1

Graphics

